NANTICOKE
ENVIRONMENTAL
MANAGEMENT
PROGRAM

ISSN 0832 3483

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NANTICOKE ENVIRONMENTAL MANAGEMENT PROGRAM

NETWORK DATA SUMMARY FOR 1983

REPORT No. ARB-168-84-ARSP

SEPTEMBER 1984

Participants: Environment Canada • Ontario Ministry of the Environment • Ontario Hydro • Stelco Inc. • Texaco Canada Inc.

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ACKNOWLEDGEMENTS

This report was prepared by P. Kiely, Data Analyst, Air Resources Branch, Ministry of the Environment, (MOE).

The data analysed in this report were collected by Moniteq Limited (under contract to Stelco Inc., Texaco Canada Inc. and the Ministry of the Environment), as well as by Ontario Hydro and the Ministry of the Environment's West Central Region.

Comments on the manuscript by Keith Heidorn of the Air Resources Branch and members of the NEMP Technical Committee are gratefully acknowledged.

Special thanks are due to William Chang for his computer programming support.

1. INTRODUCTION:

The Nanticoke Environmental Management Program (NEMP) is a co-ordinated study into the impact of industrial development in the Nanticoke area on air quality in the Haldimand-Norfolk region. It is jointly sponsored by the Federal and Provincial governments, Ontario Hydro, Stelco and Texaco. The NEMP monitoring network, established in the fall of 1978, was operated throughout 1983 to measure adherence to air quality criteria (AQC) for the protection of human health and comfort as well as that of vegetation, animal life and property. In addition to the NEMP network, Ontario Hydro has been operating an SO_2 network of approximately 16 monitors since 1975 and MOE West-Central Region has been operating gaseous monitors at Cheapside and Simcoe as well as a hi-vol network consisting of 6 samplers.

A major industrial complex comprised of a thermal generating station, a steel plant and an oil refinery is situated on the northern shore of Lake Erie in the Haldimand-Norfolk region. Ontario Hydro, Stelco and Texaco operated throughout most of 1983. Table 1 outlines the major emission sources and their 1983 emission estimates for sulfur dioxide and particulate matter. Emissions from Ontario Hydro's generating station are released from two 198-metre stacks (separated by 275 m), whereas emissions from Stelco and Texaco emanate from stacks as well as low-level sources. Monitoring stations have been located according to criteria that take into account predominant wind patterns and source configuration, as well as in reponse to concerned citizens. The network configuration for 1983 remained the same as for 1982. Figure 1 shows the location of monitoring stations and Table 2 lists the parameters monitored at each location.

This report complements the fourth data summary report covering network data up to December 1982 (4) and summarizes the data collected by the NEMP network during 1983.

2.0 Gaseous Data Analysis

2.1 Analysis of Sulfur Dioxide (SO_2) Data:

Hourly averaged SO_2 concentrations were monitored at twenty locations during 1983. Sixteen stations were operated by Ontario Hydro, two by MOE's West Central Region and two by the NEMP network. Figure 2 shows the annual frequency distribution of hourly averaged SO_2 concentrations for 1983. Seasonal frequency distribution of the hourly SO_2 concentrations is shown in Figure 3. The ninety percentile level coincided with 18 ppb for the winter of 1983 compared with 9, 10 and 10 for the spring, summer and fall season respectively.

2.1.1 Hourly SO_2 Criterion:

The hourly AQC for SO_2 is 250 ppb. There were 8 hours during 1983 when the hourly AQC was exceeded. Details of those hours with exceedances are listed in Table 3 together with the concurrent generating station load. The Nanticoke T.G.S. was the source of the SO_2 exceedances since the monitors were located directly downwind of the station for each event. The maximum hourly averaged SO_2 concentration (438 ppb) was recorded at NNW08. Table 4 shows the number of network exceedances of the hourly AQC for the period 1975-1983.

2.1.2 Daily SO_2 Criterion:

The 24-hour AQC for SO_2 is 100 ppb. Once again, there were no exceedances of the daily AQC. The maximum 24-hour average (75 ppb) was recorded at E05 on December 24.

2.1.3 Annual SO_2 Criterion:

The annual averaged values at all stations during 1983 were well below the 20 ppb criterion. The highest annual average (6 ppb) was recorded at NNE05. Table 5 summarizes the SO_2 annual averaged concentrations, as well as other statistics of the observations for individual stations.

2.2 Analysis of Ozone (0_3) Data:

Figure 4 shows the annual frequency distribution of the hourly averaged ozone concentrations for SW37, NNE39 and WNW19. At monitors SW37, WNW19 and NNE39, the ninety percentile level coincided with 54, 54 and 44 ppb respectively (Table 6). The annual average ozone concentration was 30 ppb at SW37, 30 ppb at WNW19, and 24 ppb at NNE39.

Figure 5 shows the seasonal frequency distribution of the hourly averaged 0_3 concentrations. Seasonally, ozone levels are highest during the summer period and lowest during the winter. Warm temperatures and strong insolation (characteristic of southerly winds during the summer period) are conducive to ozone formation. The ninety percentile for the entire network concided with 75, 28, 42 and 45 ppb for the summer, winter, fall and spring seasons respectively.

2.2.1 Hourly 0_3 Criterion:

The hourly AQC for ozone is 80 ppb. During 1983, there were 393 hours when the 0_3 AQC was exceeded. This year, the monitor at Simcoe reported the maximum number of exceedances (182) compared with Long Point (169) and Binbrook only (42). The Long Point monitor experienced flow problems during part of June and therefore was inoperative on several days in which 0_3 exceedances occurred. Ozone exceedances occurred on forty days during 1983. Of the 40 days thirty-eight were during the growing season (June to September).

2.3 Analysis of Nitrogen Dioxide (NO_2) Data:

Nitric oxide (NO) concentrations were subtracted from total nitrogen oxide (NO_x) values to obtain hourly NO_2 concentrations. The nitrogen oxides network once again, contained five stations (SW37, NNE39, NO7, WNW19, and NNE10). Annual average concentrations were below 10 ppb, see Table 7. Figure 6 shows the annual frequency distribution of the hourly averaged NO_2 values. Ninety percent of the time, the NO_2 concentrations did not exceed 20 ppb.

2.3.1 Hourly NO_2 Criterion:

There were no exceedances of the one-hour (200 ppb) AQC during 1983. The maximum hourly NO_2 concentration (80 ppb) was recorded at WNW19, on October 16.

2.3.2 Daily NO_2 Criterion:

The daily AQC for NO_2 is 100 ppb. During 1983, there were no exceedances of the daily AQC.

2.4 Analysis of Total Reduced Sulfur (TRS) Data:

TRS was monitored at four locations, (NNE10, NNE05, NNW08 and WNW03 during 1983. Figure 7 shows the annual frequency distribution of the hourly averaged TRS concentrations. As in 1982, the highest hourly averaged TRS concentration (46 ppb) was recorded at the Nanticoke Village (WNW03) monitor, Table 8. On June 23 during the early morning hours, three monitors recorded elevated levels of TRS. WNW03 recorded 30 ppb at 0100; 90 ppb at 0200; 10 ppb at 0300; 10 ppb at 0500 and finally 18 ppb at 0600. Monitor NNE05 recorded 17 ppb at 0200 and 11 ppb at 0300 while NNE10 recorded 9 ppb at 0300. Surface winds were calm during this period. It is suspected here that the process of quenching (water spraying of the molten slag) at Stelco caused the elevated TRS readings. Relatively high hourly averaged TRS concentrations are listed with corresponding wind data in Table 9. Of the 19 incidents of elevated TRS, 13 were recorded at or near midnight on a Wednesday or Saturday. This corresponds to the time cycle used for quenching.

2.5 Analysis of Carbon Monoxide (CO) Data:

Monitoring of CO continued at NNE39 and SW37 throughout 1983. Figure 8 shows the annual frequency distribution of hourly averaged CO concentrations for 1983.

2.5.1 Hourly CO Criterion:

There were no exceedances of the hourly (30 ppm) AQC for CO during 1983. The maximum hourly averaged concentration (9 ppm) was recorded at NNE39, Table 10.

2.5.2 Eight-Hourly CO Criterion:

There were no exceedances of the eight-hour (13 ppm) AQC for CO throughout 1983.

2.6 Analysis of Hydrocarbons Methane (CH_4) and Non-Methane (NMHC):

Hydrocarbon monitoring continued at NNE10, NNE05 and NNW08 throughout 1983. Figures 9 and 10 show the annual network frequency distribution of CH_4 and NMHC. The annual average concentrations for CH_4 and NMHC are summarized in Table 11 and 12 respectively.

It should be noted that the electrical noise problem experienced in the latter part of 1982 continued on into 1983. The validity of the observed values once again remain in doubt.

3.0 Airborne Particulates Data:

The particulate monitoring network in the Nanticoke area during 1983 consisted of 14 hi-vol samplers, operated by NEMP (Figure 11). Glass fibre filters were used at all locations with parallel sampling on Whatman 41 cellulose filters at nine stations. TSP measurements were carried out on the glass fibre filters while a detailed chemical analysis was done on selected Whatman 41 filters. Some of the glass fibre filters were also analysed for inorganic (CF) and total carbon (CT). A six day sampling cycle was used at all stations except for the hi-vol samplers at W07, NW03 and NNW06, which operated on a three day cycle to monitor the Stelco emissions. Sampling periods were 24-hours in duration.

Suspended particulates are summarized by station in Table 13. As in previous years, the annual geometric means were in the 30-40 ug/m^3 range. The annual and seasonal frequency distributions of TSP for the entire network are shown in Figures 12 and 13. Figure 14 shows the monthly geometric mean for the NEMP network TSP data (1979-1983). The monthly trend in TSP levels has been similar for all five years data.

3.1 Daily TSP Criterion:

The daily AQC for TSP is 120 ug/m^3. During 1983 there were 6 exceedances of the criterion.

The two TSP exceedances recorded at montiors NW03 and NNW06 on June 14 are related to agricultural activity since the farmland adjacent to these monitor locations was being ploughed on this day.

Exceedances reported at NNW06 (134 ug/m^3) on June 17 and at NNE05 (137 ug/m^3) on June 23 coincide with regional episodes since above normal TSP levels were recorded throughout the Nanticoke region on these days.

It is possible that the remaining two exceedances are attributed to industrial emissions. On April 27 and July 14, the monitor at NW03 recorded daily TSP concentrations of 129 and 132 ug/m^3 respectively. Surface winds on these days were predominantly southwesterly at 10 to 20 km/hr. Details of the TSP exceedance events are listed in Table 14.

3.1.1 Annual TSP Criterion:

The annual AQC for TSP is 60 ug/m^3. Throughout 1983, there were no exceedances of the annual criterion. The maximum yearly geometric mean (42 ug/m^3) was recorded at NNE39.

3.2 Chemical Analysis Results:

Annual and seasonal means for sulfate, nitrate, calcium, magnesium and total carbon levels are shown in Table 15. Data for all four years of network operation (1979-1983) have been included for comparison purposes. Annual means for all five parameters in 1983 are comparable to those observed in other years. As in previous years, sulfate and total carbon concentrations are highest during the summer season.

During 1983, sulfate, nitrate, calcium, magnesium and total carbon concentrations are higher for southerly versus northerly winds (Table 16).The chemical analyses results of the selected Whatman 41 filters collected during 1983 for the entire NEMP network are listed in Appendix 1. Total and free carbon results are also listed by station for 1983 in Appendix 1.

4.0 Precipitation Data:

The NEMP precipitation network continued throughout 1983 to collect monthly samples at six sites in the Nanticoke region (Figure 15). Precipitation samples are analyzed for pH, major ions, some nutrients and trace metals. Chemical analysis results for all 1983 precipitation samples are listed in Appendix 2.

Network averaged pH, selected major ion and trace metal concentrations are listed in Table 17. For comparison purposes 1979 to 1983 concentrations are also shown.

As in previous years, there is little annual variation in precipitation concentrations.

5.0 Summary:

This report summarizes the 1983 gaseous data collected by the NEMP, Ontario Hydro and MOE West Central Region networks as well as the 1983 particulate and precipitation data collected by the NEMP network.

The hourly (250 ppb) AQC for SO_2 was exceeded 8 times during 1983. There were no exceedances of the daily (100 ppb) AQC for SO_2. The annual average values at all stations for 1983 were less than half of the annual criterion (20 ppb).

The ozone network recorded 393 hourly exceedances of the ozone AQC (80 ppb), 169 at SW37, 182 at WNW19 and only 42 at NNE39. Ozone exceedances occurred on thirty-eight days during the growing season.

As in previous years, NO_2 and CO levels were well below their respective AQC during 1982.

Annual average TRS concentrations were less than or equal to 1 ppb for all four monitors.

Although the validity of the data is in question the annual average for methane and non-methane hydrocarbon was less than 2 ppm and 1 ppm respectively.

There were 6 TSP exceedances of the daily (120 ug/m^3) AQC during 1983. Two of these exceedances were attributed to industrial emissions, two were related to agricultural activity and two were part of regional episodes. Sulfate, nitrate, calcium, magnesium and total carbon concentrations were higher for southerly versus northerly winds.

The pH for wet deposition in the NEMP network during 1983 was 4.4.

Ambient air quality in the Haldimand-Norfolk region continued to be satisfactory throughout 1983.

REFERENCES

1. Kiely, P. and Sahota, H. 1981: Climatological and Aerometric Analysis on Nanticoke Environment Management Program Data up to December 1979. MOE Report No. ARB-18-82-ARSP.

2. Kiely, P. 1982: Nanticoke Environmental Management Program Network Data Summary for 1980. MOE Report Number ARB-20-82-ARSP.

3. Kiely, P. 1983: Nanticoke Environmenal Management Progam Network Data Summary for 1981. MOE Report Number ARB-144-83-ARSP.

4. Kiely, P. 1984: Nanticoke Environmenal Management Program Network Data Summary for 1982. MOE Report Number ARB-44-84-ARSP.

5. Personal Communication with Ann Douglas, Ontario Hydro.

6. Sahota, H. 1980: First Data Report on Nanticoke Environmental Management Program Network Data up to December 1979. MOE Report Number ARB-TDA-64-80.

Table 1

Emission Estimates (metric tons per year)

	Particulates					Sulfur Dioxide				
	1979	1980	1981	1982	1983	1979	1980	1981	1982	1983
Ontario Hydro	1,500	2,000	2,400	2,400	2,500	155,000	144,000	181,000	207,000	199,000
Texaco	300	290	280	460	370	8,500	6,800	4,200	6,100	6,430
Stelco	-	106*	191+	821	431	-	170*	338+	2,492	2,949

* coke ovens not operational
+ coke ovens operational for only one month

Table 2

Station Location and Description

Geog Id	Numer Id	Site Name	SO2	O3	NOX	CO	TRS	HC	TSP	COMP HI-VOL	COH	PREC
SW37	22901	Long Point Park	X	X	X	X			X		X	
NNW08	22905	Nanticoke Road	X				X	X				
N07	22906	Sandusk	X		X							
NNE05	22904	Walpole South School	X				X	X	X	X		
NNE10	22903	Cheapside	X		X		X	X				
NNE39	22902	Binbrook West	X	X	X	X			X		X	X
WNW03	22871	Nanticoke Village	X				X					
SW40	22959	Big Creek							X	X		
W07	22953	Dogs Nest East							X	X		X
NNE22	22960	Dufferin North							X			X
NE16	22957	Fisherville North							X	X		
NE27	22956	Canfield South							X			X
NE41	22958	Canboro East							X			X
NNW06	22963	Stelco North							X	X		
NW03	22961	Nanticoke North							X	X		
E04	22952	Peacock Point Park							X	X		
NNW18	22954	Villa Nova							X			X
ENE17	22955	Rainham Centre South							X	X		
WNW19	22071	Simcoe Horticultural	X	X	X							
N15	22812	Garnet	X									
NNE09	22822	Dry Creek	X									
NNE16	22823	Balmoral	X									
NNE20	22825	Decewsville	X									
NE19	22832	Kohler Road	X									
ENE11	22841	Selkirk	X									
E05	22851	Peacock Point	X									
W13	22861	Port Dover	X									
WNW20	22872	Bloomsburg	X									
NNW11	22882	Jarvis	X									
NNW15	22884	Livingston	X									
N17	22951	Hagersville South							X	X		
ENE18	22842	Rainham Center	X									
NE07	22962	Dry Creek --- Acoustic Sounder Site										
NNW12	22883	Jarvis Met Tower --- Meteorological Tower Site										

Table 3

Details of SO2 Exceedance Events for 1982

Date	Time (EST)	Monitor	Average SO2 (ppb)	Wind Speed (km/hr)	Wind Dir	Station Load (MW)
APRIL 29	1200	NNW08	252	12	SSE	2926
	1300	NNW08	248	11	SSE	2925
MAY 18	1200	W18	251	21	E	2978
JUNE 22	1100	NNW08	488	11	SSE	2919
	1200	NNW08	411	14	SSE	2930
AUGUST 14	1300	NNW08	318	18	SSE	1819
AUGUST 17	1300	NNE20	291	18	SSW	0478
SEPTEMBER 21	0200	NNE05	389	35	SSW	1188

Hourly AQC for SO2 is 250 ppb
Wind data is from the 85 m level of Jarvis meteorological tower

Table 4

Exceedances of the Hourly SO2 AQC by Station - 1975 to 1983

Station	1975	1976	1977	1978	1979	1980	1981	1982	1983
NW7	1	3	0	2	2	0	3	0	0
N15	0	0	0	0	0	1	1	0	0
NNE05	-	-	-	0	0	2	2	1	1
NNE09	4	4	3	4	1	1	4	1	0
NNE16	4	4	1	2	1	2	1	3	0
NNE17	1	0	3	-	-	-	-	-	-
NNE20	-	-	-	0	0	1	0	3	1
NE10	1	1	0	0	-	-	-	-	-
NE19	0	0	0	0	0	0	0	1	0
ENE11	0	0	0	0	0	0	0	0	0
ENE18	0	0	0	0	0	0	0	0	0
E05	0	0	0	0	1	0	1	0	0
W13	0	0	0	1	0	0	0	0	1
WNW08	0	0	0	0	1	0	0	0	0
WNW20	0	2	0	0	0	0	3	0	0
NNW06	0	3	3	2	1	0	2	0	5
NNW11	0	1	1	0	1	0	0	0	0
NNW15	0	2	1	1	0	0	0	0	0
SW07	-	-	-	0	0	0	0	0	0
WNE09	-	-	-	0	0	0	1	0	0
WNW19	0	0	0	0	0	0	0	0	0
WNW10	0	0	0	4	3	1	4	1	0
	11	20	12	20	11	8	19	10	8

- monitor not in operation
Hourly AQC for SO2 is 850 ppb

Table 3

Sulfur Dioxide (SO2) Data Summary by Station

STATION ID	ARITHMETIC MEAN	MAXIMUM	CONCENTRATION (ppb) NOT EXCEEDED DURING A GIVEN % OF HOURS				# OF HOURS MONITORING	% OF VALID DATA	NUMBER OF EXCEEDANCES	DAILY MAX
			10%	50%	90%	99%				
NW7	3	179	0	2	12	41	8760	98.41	0	42
N15	4	198	0	1	9	30	8760	98.85	0	27
NNE05	4	289	0	2	16	48	8760	89.82	1	73
NNE09	4	139	0	1	10	36	8760	95.28	0	89
NNE14	3	221	0	2	14	40	8760	83.98	0	44
NNE20	4	291	0	1	8	37	8760	98.97	1	48
NE19	4	134	0	1	10	35	8760	84.84	0	27
ENE11	3	117	0	2	12	30	8760	98.87	0	30
ENE10	4	94	0	2	11	30	8760	98.99	0	28
E05	5	214	0	2	12	47	8760	98.89	0	73
W18	4	251	0	1	9	32	8760	91.79	1	27
WNW08	3	78	0	1	10	32	8760	88.48	0	34
WNW20	4	211	0	1	9	34	8760	91.35	0	34
NWW08	5	488	0	1	11	36	8760	81.74	3	54
NWW11	4	139	0	1	9	32	8760	91.97	0	32
NWW15	4	267	0	2	11	35	8760	98.87	0	29
WNW19	3	210	0	0	10	36	8706	94.99	0	37
NNE10	4	130	0	0	10	40	8660	99.35	0	32
SW07	4	105	0	1	8	35	7887	75.64	0	36
NNE09	5	290	0	2	11	36	8086	89.58	0	36

concentrations are in ppb
hourly AQC for SO2 is 230 ppb
daily AQC for SO2 is 100 ppb

Table 6

Ozone (O3) Data Summary by Station

Station Id	Year	Conc (ppb) not exceeded during given % of hours 10%	30%	90%	99%	Maximum conc	Annual avg	% Valid Data	# Monitoring Hours	# Exceedances of AQC
	1979	13	27	53	89	140	30	67.5	5917	84
	1980	15	29	60	95	123	33	87.4	7670	225
SW87	1981	12	28	55	90	129	31	91.9	8028	139
	1982	14	32	58	86	114	34	98.8	8624	131
	1983	12	26	54	93	134	30	86.8	8540	169
	1979	9	25	46	75	110	27	82.4	6810	34
	1980	7	22	41	69	102	24	74.0	6496	15
NNEB9	1981	6	23	43	75	100	24	96.2	8427	44
	1982	7	24	48	67	89	25	97.3	8505	9
	1983	5	21	44	76	116	24	84.1	8477	42
	1979	9	26	50	82	140	28	95.8	8894	96
	1980	9	24	46	75	99	26	98.9	8169	43
NNW19	1981	10	26	50	89	111	29	96.2	8427	138
	1982	12	30	56	88	115	34	94.5	8615	122
	1983	10	27	54	91	128	30	98.4	8703	182

Values are in ppb
Hourly AQC for O3 is 80 ppb

Table 7

Nitrogen Dioxide (NO2) Data Summary by Station

Station Id	Year	Conc (ppb) not exceeded during given % of hours 10%	20%	90%	99%	Maximum conc	Annual avg	% Valid Data	# Monitoring Hours	# Exceedances of AQC
	1979	2	7	21	44	79	10	78.3	5548	0
	1980	2	6	14	25	52	7	67.9	6569	0
SWB7	1981	2	6	15	31	58	7	N/A	7369	0
	1982	2	6	15	29	58	7	97.4	8621	0
	1983	2	5	13	28	44	6	88.7	7769	0
	1979	2	8	28	47	68	11	98.8	8588	0
	1980	2	7	21	38	68	10	98.9	7284	0
NNE39	1981	1	7	21	47	74	10	N/A	6844	0
	1982	2	7	21	42	71	10	97.2	8587	0
	1983	2	7	20	30	48	9	99.1	7926	0
	1979	1	7	18	30	57	8	96.9	4840	0
	1980	2	8	17	30	57	9	98.4	7248	0
NB7	1981	1	6	17	28	44	8	N/A	4920	0
	1982	2	8	20	37	70	10	84.9	7471	0
	1983	1	4	20	24	35	9	84.8	4488	0
	1979	0	10	20	30	180	10	97.3	8575	0
	1980	0	10	20	40	60	8	97.8	7745	0
NNE10	1981	0	10	20	40	180	10	98.9	8760	0
	1982	0	10	20	40	90	7	79.9	8708	0
	1983	0	10	20	30	50	8	96.1	8784	0
	1979	0	10	20	40	80	10	98.7	8686	0
	1980	0	10	20	40	90	12	96.8	8748	0
NNW19	1981	0	10	20	40	90	14	98.8	6665	0
	1982	0	10	20	40	180	10	91.9	8617	0
	1983	0	10	20	40	80	9	98.2	8698	0

Values are in ppb
Hourly AQC for NO2 is 200 ppb

Table 8

Total Reduced Sulphur (TRS) Data Summary by Station

Station Id	Year	Conc (ppb) not exceeded during given % of hours 10%	50%	90%	99%	Maximum conc	Annual avg	% Valid Data	# Monitoring Hours
NNE10	1979	0	0	1	2	25	0.4	69.2	3030
	1980	0	0	2	2	14	0.5	76.0	3864
	1981	0	0	2	3	7	0.4	98.3	4791
	1982	0	0	2	4	9	0.6	90.7	7623
	1983	0	0	1	4	10	0.5	97.7	7921
NNE05	1979	0	0	1	2	40	0.4	74.3	3935
	1980	0	0	1	2	9	0.3	67.9	4462
	1981	0	0	1	3	30	0.3	90.1	7901
	1982	0	0	1	3	12	0.2	99.9	7685
	1983	0	0	0	2	17	0.1	94.1	7439
NNW08	1979	0	0	1	2	8	0.3	49.2	3932
	1980	0	0	1	3	84	0.3	71.3	5738
	1981	0	0	1	2	7	0.3	97.2	7618
	1982	0	0	1	3	7	0.3	93.1	7446
	1983	0	0	0	2	24	0.1	93.8	7179
NNW03	1979	N/O	N/O	N/O	N/O	N/O	N/O	N/O	N/O
	1980	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	1981	0	0	2	4	36	0.4	97.2	7714
	1982	0	0	2	5	44	0.5	88.2	7326
	1983	0	1	3	4	90	1.0	89.5	7449

Values are in ppb
N/O Not Operating
N/A Not Available - station operated only part of the year.

Table 9

Details of TRS Events Exceeding 8 ppb* for 1982

Date	Time (EST)	Monitor	Average TRS (ppb)	Wind Speed (km/hr)	Wind Dir
January 1	1500	UNW08	9	31	SW
28	0400	UNW08	9	calm	calm
February 2	2200	UNW08	24	7	SSW
3	0800	UNW08	9	calm	calm
April 7	1400	UNW08	9	13	WSW
	1800	UNW08	9	17	WSW
27	1400	UNW08	10	24	WSW
	1700	UNW08	20	22	WSW
	1800	UNW08	23	17	WSW
30	2000	UNW08	17	18	WSW
	2100	UNW08	17	17	W
		NNE08	9	17	W
June 23	0100	UNW08	30	calm	calm
	0200	UNW08	90	calm	calm
		NNE08	17		
	0300	UNW08	10		
		NNE08	11	calm	calm
		NNE10	9		
	0500	UNW08	10	calm	calm
	0600	UNW08	18	8	SW
25	2200	UNW08	10	calm	calm
	2300	UNW08	10	calm	calm
26	2000	UNW08	11	18	WSW
	2100	UNW08	11	16	WSW
	2200	UNW08	14	17	WSW
27	0100	UNW08	14	15	WSW
	0200	UNW08	12	17	WSW
July 7	2200	UNW08	12	10	WSW
October 4	0400	UNW08	9	12	SW
	0500	UNW08	14	14	SW
21	0900	NNW08	24	15	ENE
22	1300	NNE10	9	14	SE
	1400	NNE10	9	11	SE
	1500	NNE10	10	10	SE
	1600	NNE10	10	8	ESE
November 24	0500	UNW08	17	24	WSW
	0600	UNW08	11	20	WSW
December 2	1200	UNW08	11	12	WSW
15	0400	UNW08	24	21	WSW
	0500	UNW08	15	20	WSW
22	0800	UNW08	10	19	S

* arbitrarily chosen
Wind data is from the 10m level of the Jarvis Met. Tower

Table 10

Carbon Monoxide (CO) Data Summary by Station

Station Id	Year	Conc (ppm) not exceeded during given % of hours 10%	5%	9%	99%	Maximum conc	Annual avg	% Valid Data	# Monitoring Hours	# Exceedances of AQC
	1979	0	0	0	1	6	0.1	90.5	6384	0
	1980	0	0	0	1	2	0.1	90.7	7971	0
SW37	1981	0	0	1	1	2	0.2	94.7	8427	0
	1982	0	0	1	2	4	0.1	95.9	8428	0
	1983	0	0	1	1	8	0.2	90.9	8004	0
	1979	0	0	1	1	4	0.1	80.4	7089	0
	1980	0	0	0	1	3	0.1	80.7	7174	0
NNE39	1981	0	0	0	1	2	0.1	90.9	8718	0
	1982	0	0	0	1	2	0.1	99.9	8875	0
	1983	0	0	1	1	9	0.1	99.2	8682	0

Values are in ppm
Hourly AQC for CO is 30 ppm

Table 11

Methane (CH4) Data Summary by Station

Station Id	Year	Conc (.1ppm) not exceeded during given % of hours				Maximum conc	Annual avg	% Valid Data	# Monitoring Hours
		10%	50%	90%	99%				
	1979	14	16	20	41	46	18	55.2	4857
	1980	13	14	16	18	28	14	78.3	6921
NNE10	1981	13	15	16	19	25	15	91.1	8052
	1982	13	14	16	20	46	15	99.9	8140
	1983	14	16	18	25	47	16	96.3	8385
	1979	11	14	18	39	88	15	81.9	6012
	1980	12	13	15	29	59	14	81.0	7118
NNE05	1981	12	14	16	21	55	14	90.2	7937
	1982	13	15	18	28	84	16	91.0	7355
	1983	12	14	17	20	26	14	96.6	7278
	1979	14	19	22	26	34	19	76.8	2820
	1980	12	15	17	21	32	15	78.3	6874
NNW08	1981	13	15	17	22	39	15	92.9	8258
	1982	12	15	18	22	57	15	79.8	6712
	1983	14	15	17	21	29	15	96.2	8327

Values are in .1 ppm

Table 12

Non-Methane Hydrocarbon Data Summary by Station

Station Id	Year	Conc (.1 ppm) not exceeded during given % of hours				Maximum conc	Annual avg	% Valid Data	# Monitoring Hours
		10%	50%	90%	99%				
	1979	0	2	37	140	180	12	57.2	3774
	1980	1	3	6	9	125	4	74.2	6521
NNE10	1981	2	7	10	14	36	7	89.9	8224
	1982	1	6	11	16	92	6	93.0	8245
	1983	0	2	6	11	170	3	92.9	8390
	1979	4	6	11	16	38	7	81.0	5948
	1980	2	5	9	14	77	6	77.8	6832
NNE05	1981	3	5	8	11	31	5	97.1	7998
	1982	3	5	8	11	16	5	89.1	7801
	1983	2	4	6	10	18	4	89.3	7253
	1979	4	6	8	14	51	6	74.8	2819
	1980	4	7	9	11	18	7	74.4	6710
NNW08	1981	6	8	10	12	19	8	93.8	8253
	1982	2	5	11	13	17	6	75.7	6546
	1983	0	2	4	6	12	2	97.6	8256

Values are in .1 ppm

Table 13

Total Suspended Particulates (TSP) Data Summary By Station

STATION ID	GEOMETRIC MEAN	MAXIMUM	CONCENTRATION NOT EXCEEDED DURING A GIVEN % OF SAMPLE DAYS 10%	50%	90%	99%	STANDARD DEVIATION	NUMBER OF SAMPLES	NUMBER OF EXCEEDANCES
NNE39	42	109	29	42	69	85	1.5	59	0
NNE05	32	184	16	32	69	78	1.7	56	1
N17	32	101	15	30	71	91	1.7	58	0
E04	29	75	13	29	51	54	1.6	55	0
W07	27	106	13	29	54	71	1.8	110	0
NNW18	30	116	16	31	77	87	1.9	58	0
ENE17	30	76	14	31	55	71	1.6	58	0
NE27	29	76	20	42	64	75	1.5	55	0
NE16	33	96	14	34	75	89	1.7	58	0
NE41	35	97	15	38	62	92	1.7	46	0
SW40	32	66	17	33	56	66	1.6	51	0
NNE22	28	113	22	30	70	75	1.5	52	0
NW03	40	176	19	34	98	129	1.9	111	3
NNW04	38	379	14	31	80	111	2.0	119	2

Concentrations are in ug/m3
Daily AQC for TSP is 120 ug/m3

Table 14

Details of TSP Exceedance Events for 1983

Date	Monitor	Average TSP (ug/m3)	Wind Speed (kn/hr)	Prevailing Wind Direction
April 27	NW03	129	10 to 25	southwesterly
June 14	NW03	176 *	5 TO 10	southeasterly
	NNW04	379 *		
June 17	NNW04	187	7 TO 15	southerly
June 29	NNE05	137	15 TO 25	south-southwesterly
July 14	NW03	132	10 TO 20	southwesterly

* Suspected cause is agricultural activity
Daily AQC for TSP is 120 ug/m3

Table 15

Annual and Seasonal Distribution of Particulates

		SO4	NO3	Ca	Mg	CT
Winter	1979	3.2 (19)	4.0 (19)	0.78 (15)	0.17 (16)	2.7 (18)
	1980	5.4 (48)	3.8 (48)	0.62 (48)	0.22 (48)	3.9 (48)
	1981	6.1 (46)	3.8 (45)	0.79 (46)	0.19 (46)	4.8 (32)
	1982	4.9 (38)	2.2 (38)	0.77 (38)	0.21 (38)	3.4 (31)
	1983	2.6 (45)	1.7 (45)	0.60 (45)	0.22 (45)	3.6 (41)
Spring	1979	4.5 (28)	2.8 (28)	0.76 (24)	0.20 (24)	3.1 (23)
	1980	4.7 (48)	3.1 (48)	1.11 (48)	0.32 (48)	3.7 (42)
	1981	5.0 (47)	3.2 (47)	1.36 (47)	0.47 (47)	5.0 (31)
	1982	3.2 (47)	2.0 (47)	0.99 (47)	0.30 (47)	4.6 (45)
	1983	4.1 (41)	2.9 (41)	1.23 (41)	0.37 (41)	5.8 (39)
Summer	1979	7.2 (43)	1.3 (42)	0.78 (42)	0.15 (46)	6.4 (43)
	1980	7.5 (34)	2.5 (34)	0.84 (33)	0.19 (28)	6.7 (27)
	1981	8.9 (50)	2.0 (50)	0.81 (50)	0.24 (50)	5.9 (50)
	1982	6.5 (48)	1.6 (48)	0.88 (42)	0.27 (48)	7.2 (48)
	1983	7.1 (49)	2.6 (49)	1.13 (49)	0.34 (49)	7.6 (78)
Fall	1979	4.7 (42)	2.4 (42)	0.48 (42)	0.25 (42)	4.8 (37)
	1980	5.0 (29)	2.5 (29)	0.94 (27)	0.19 (27)	3.9 (29)
	1981	4.7 (48)	2.9 (48)	0.96 (48)	0.30 (48)	4.9 (44)
	1982	3.3 (51)	2.1 (51)	0.74 (51)	0.22 (51)	5.2 (51)
	1983	3.9 (41)	1.8 (41)	0.73 (41)	0.23 (41)	5.7 (41)
Annual	1979	5.3	2.1	0.58	0.21	4.5
	1980	4.6	2.2	0.88	0.22	4.4
	1981	5.7	2.8	0.99	0.29	4.7
	1982	4.6	2.2	0.82	0.24	5.3
	1983	4.7	2.2	0.90	0.29	5.9

concentrations are in ug/m3
bracketed values indicate number of cases considered
values are expressed as geometric means
CT IS Total Carbon

Table 16

Distribution of Particulates According to Wind Direction

Parameter	Southerly Wind	Northerly Wind
SO4	7.8 (101)	2.6 (61)
NO3	3.0 (101)	1.5 (69)
Ca	1.2 (101)	0.79 (69)
Mg	0.34 (101)	0.26 (69)
CT	7.5 (102)	4.5 (66)

concentrations are in ug/m3
bracketed values indicate number of cases considered
values expressed are geometric means

Table 17

NEMP Precipitation Data - 1979 to 1983

Parameter	1979 wean	1980 wean	1981 wean	1982 wean	1983 wean
pH	4.0 (51)	4.1 (69)	4.1 (66)	4.1 (64)	4.4 (62)
SO4	5.0 (62)	4.9 (71)	5.2 (65)	4.0 (65)	3.4 (62)
N-NO3	0.68 (67)	0.65 (71)	0.67 (65)	0.55 (63)	0.48 (62)
Ca	0.71 (67)	0.54 (71)	0.45 (65)	0.39 (65)	0.37 (61)
Mg	0.19 (67)	0.14 (72)	0.10 (65)	0.09 (65)	0.09 (61)
K	0.12 (69)	0.08 (72)	0.06 (64)	0.06 (65)	0.05 (61)
Fe	0.07 (70)	0.05 (65)	0.07 (64)	0.11 (61)	0.05 (62)
Zn	0.09 (66)	0.10 (65)	0.01 (64)	0.01 (62)	0.01 (62)

concentrations are in MG/L
( ) number of samples
wean - volume weighted average
pH was converted to HF ion concentration, averaged, then converted back to pH.

Figure 1
Monitoring Stations in the Haldimand-Norfolk Region

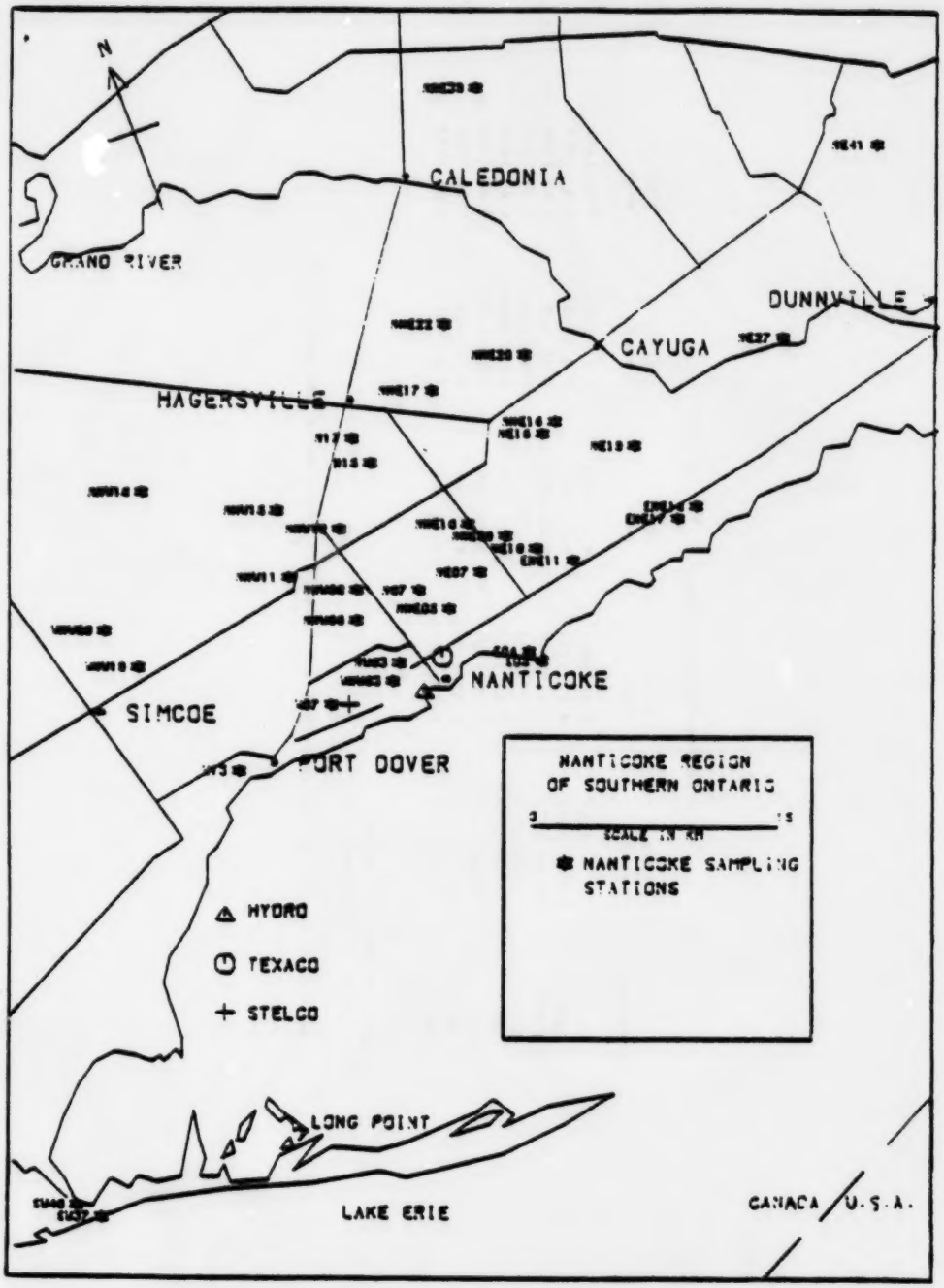


Figure 2

Annual Frequency Distribution of SO_2 for 1983

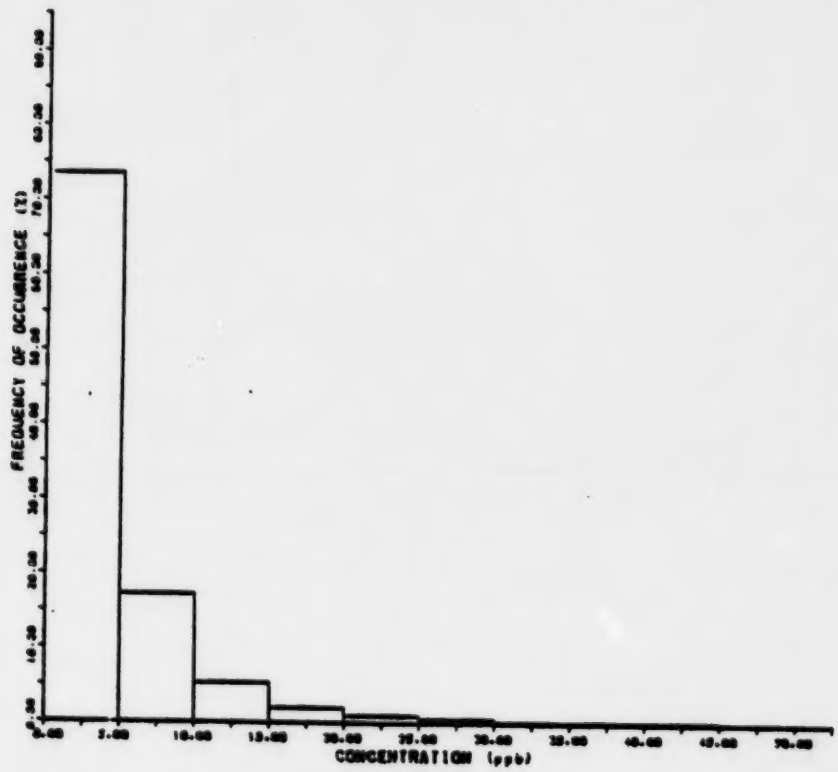


Figure 3
Seasonal Frequency Distribution of SO_2 for 1983

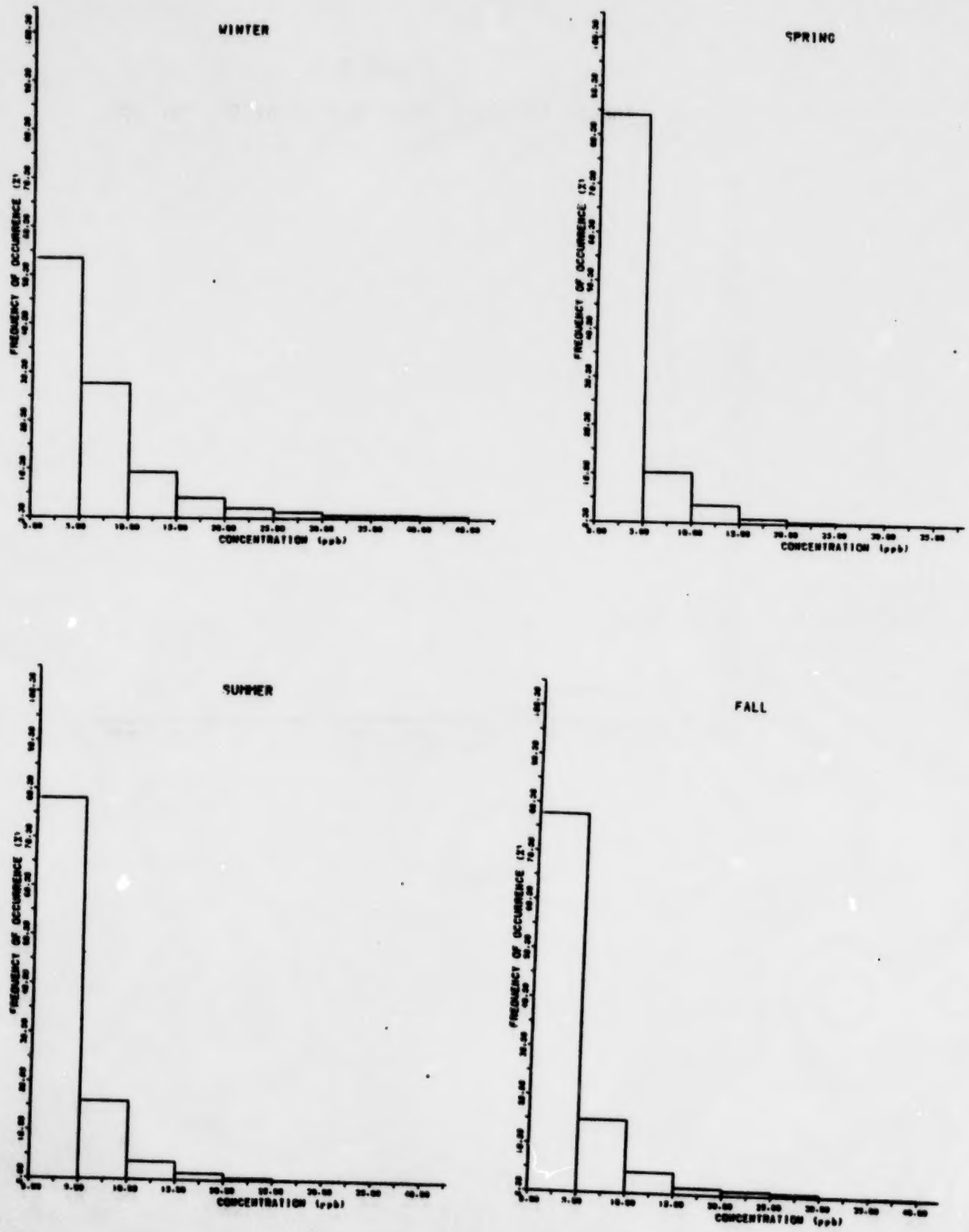


Figure 4

Annual Frequency Distribution of O_3 for 1983

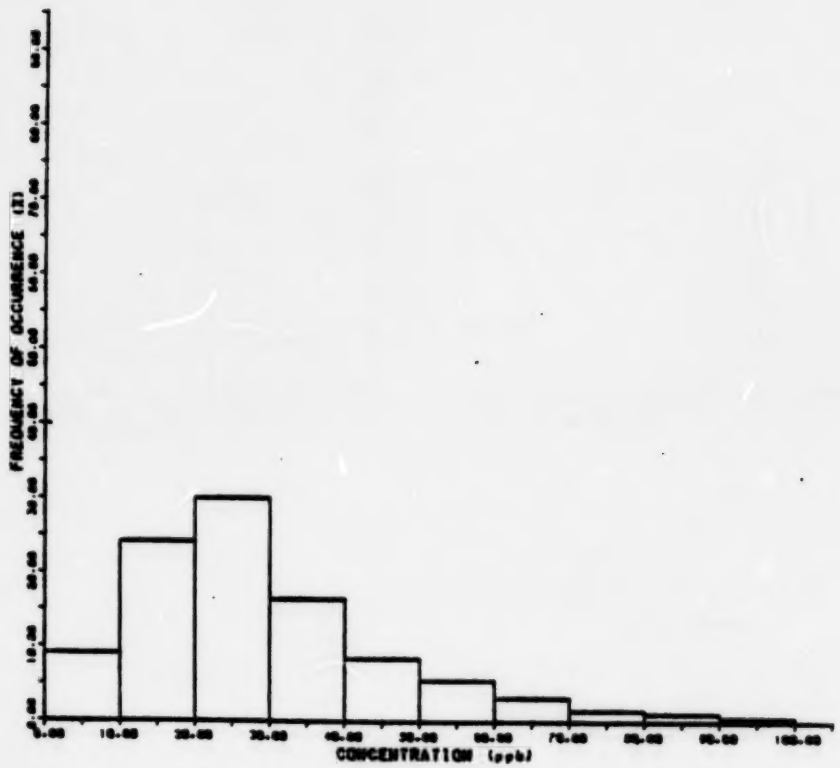


Figure 5
Seasonal Frequency Distribution of O_3 for 1983

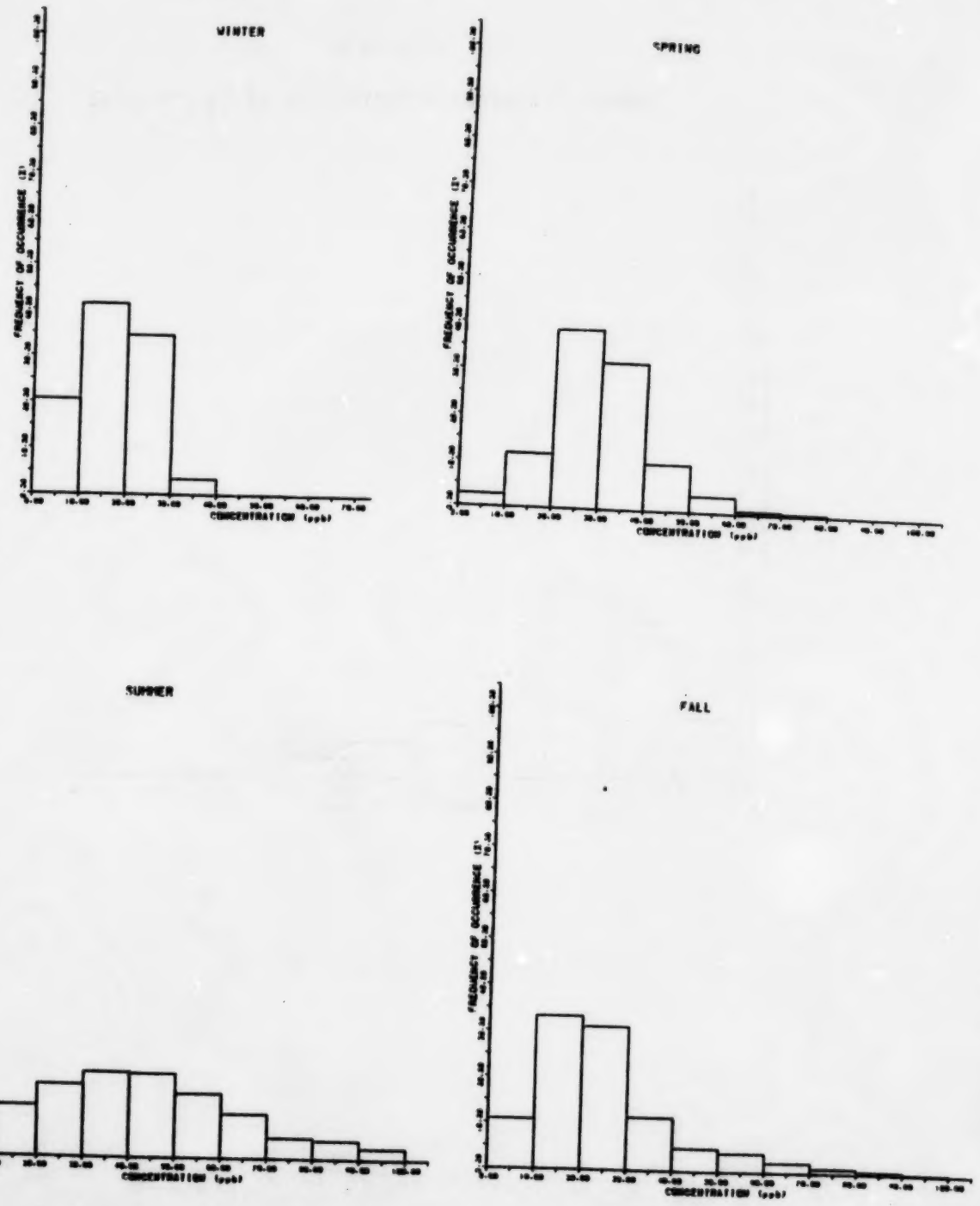


Figure 6

Annual Frequency Distribution of NO_2 for 1983

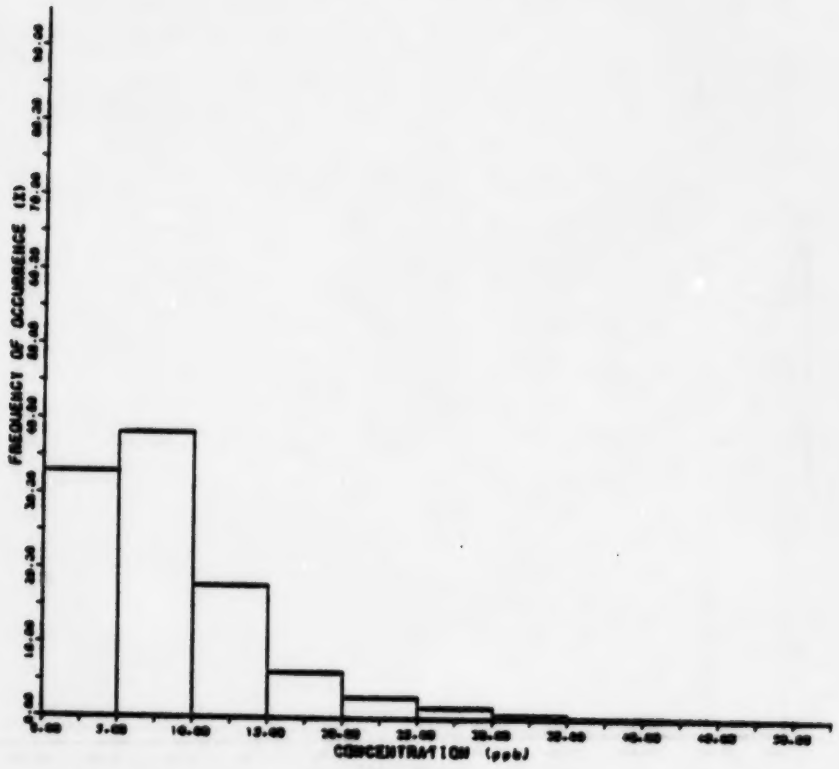


Figure 7

Annual Frequency Distribution of TRS for 1983

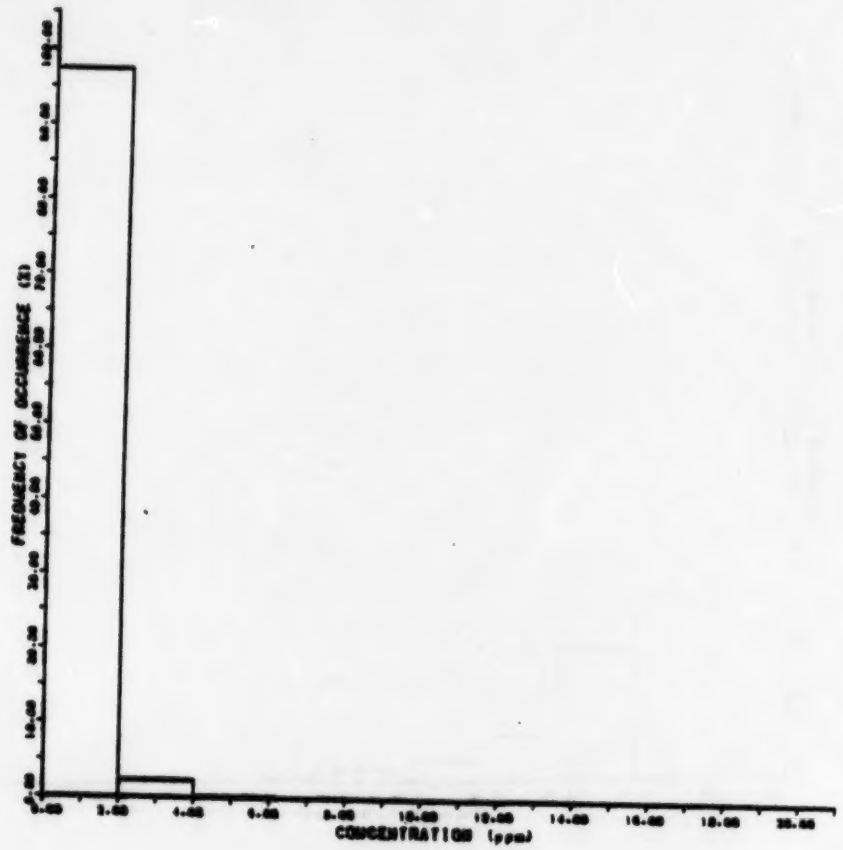


Figure 8

Annual Frequency Distribution of CO for 1983

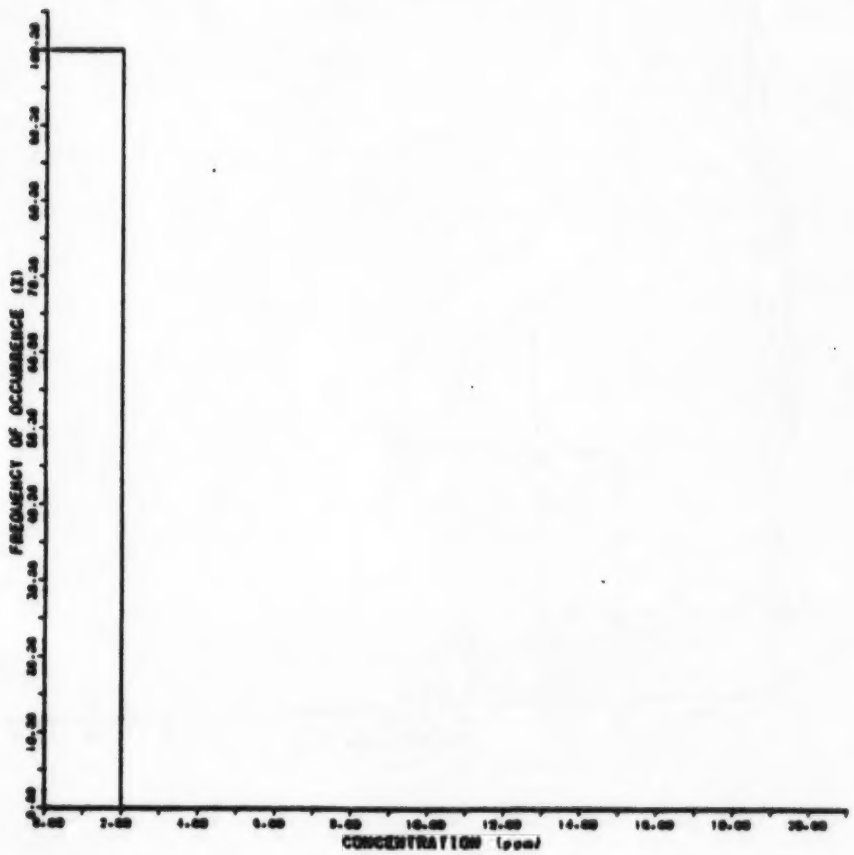


Figure 9

Annual Frequency Distribution of CH_4 for 1983

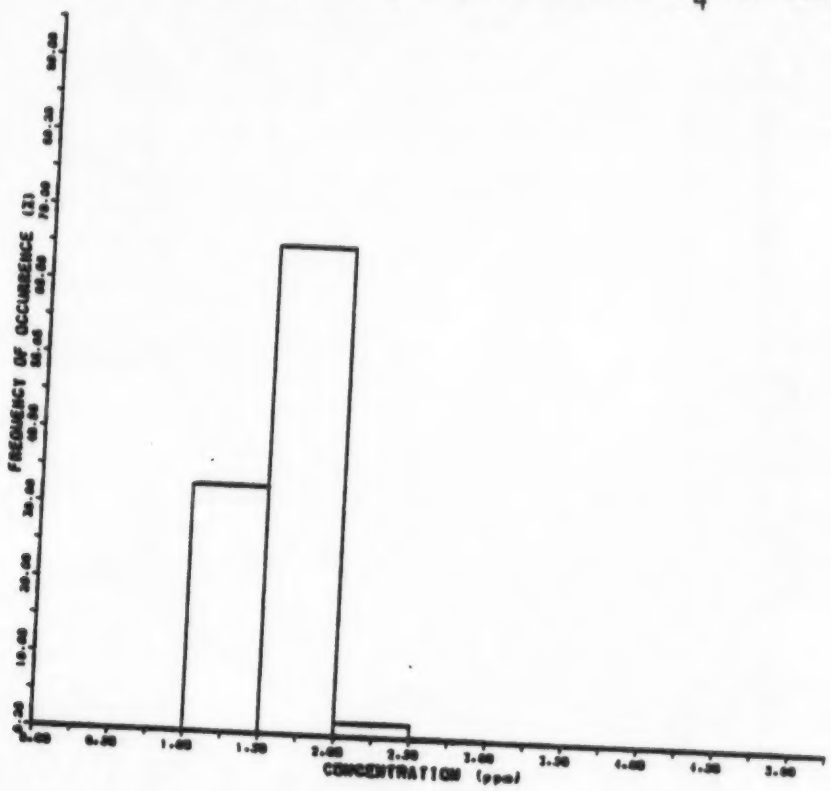


Figure 10

Annual Frequency Distribution of NMHC for 1983

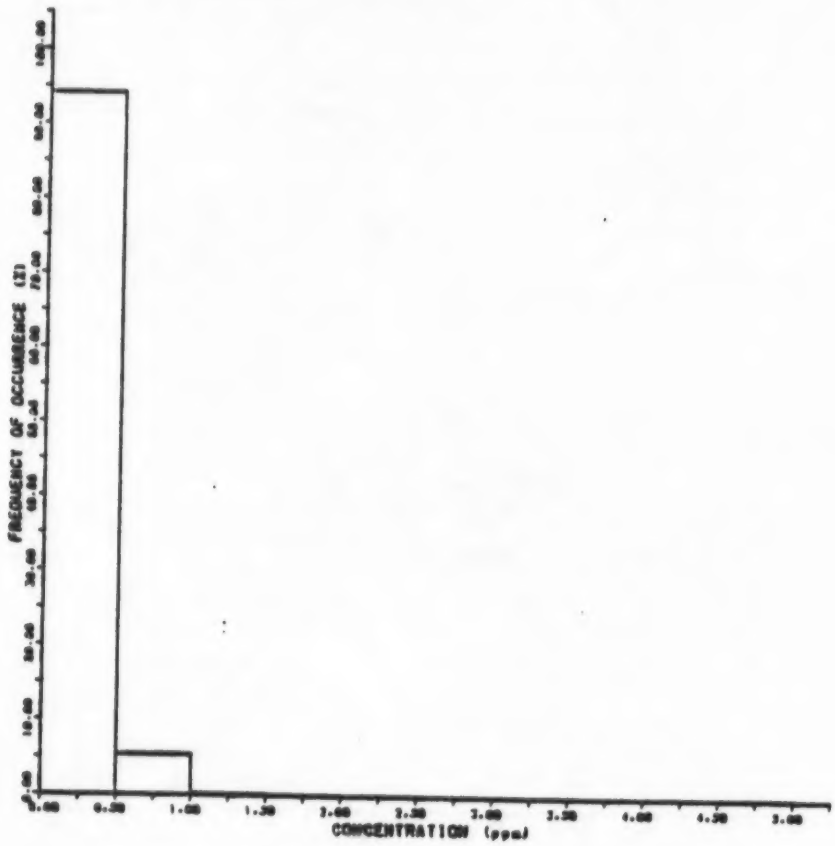


Figure 11

HI-VOL SAMPLING NETWORK

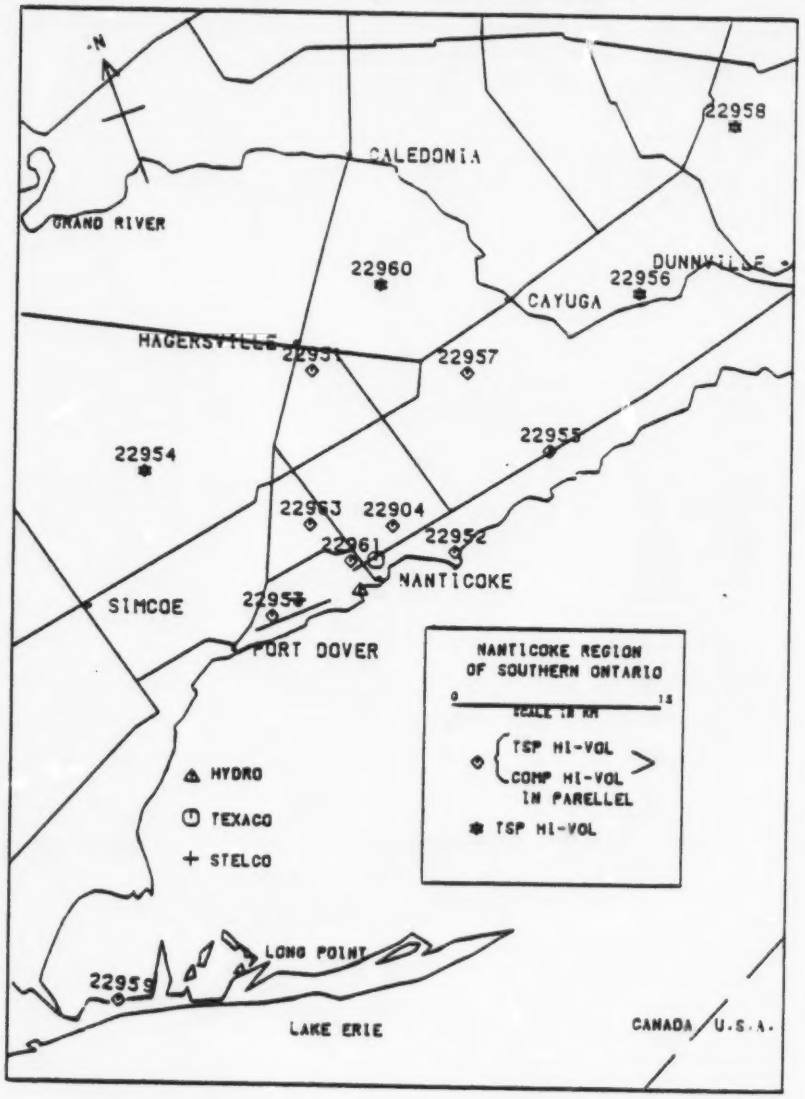


Figure 12

Annual Frequency Distribution of TSP for 1983

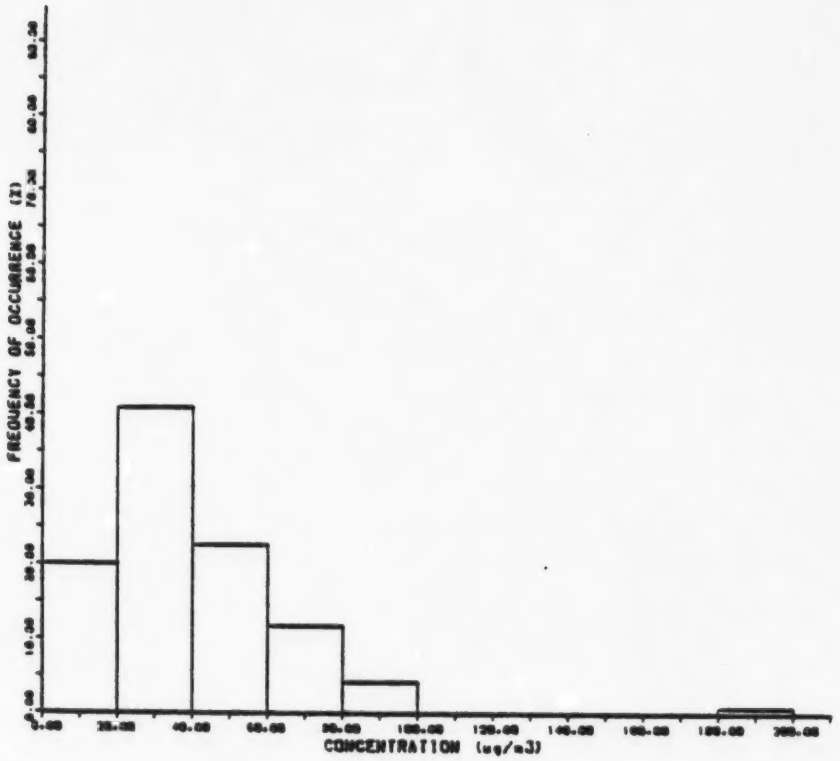
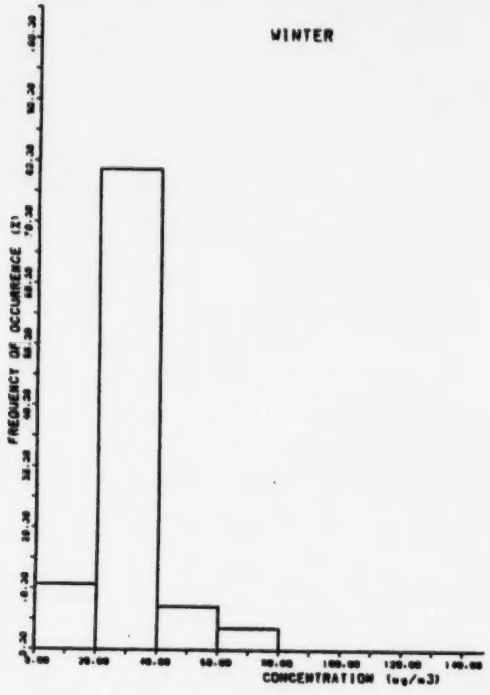
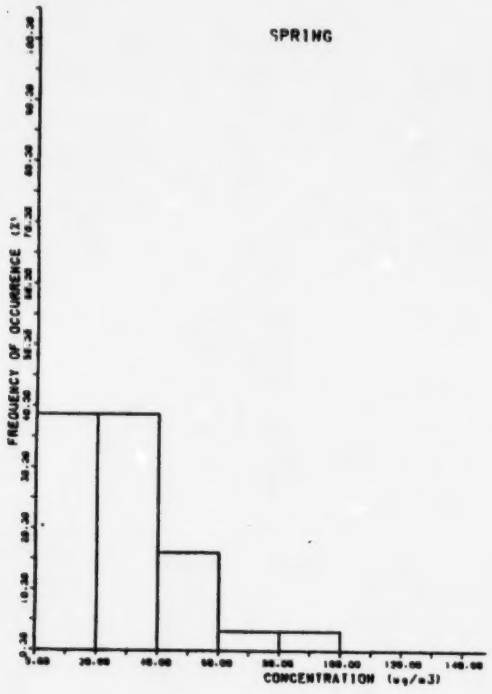
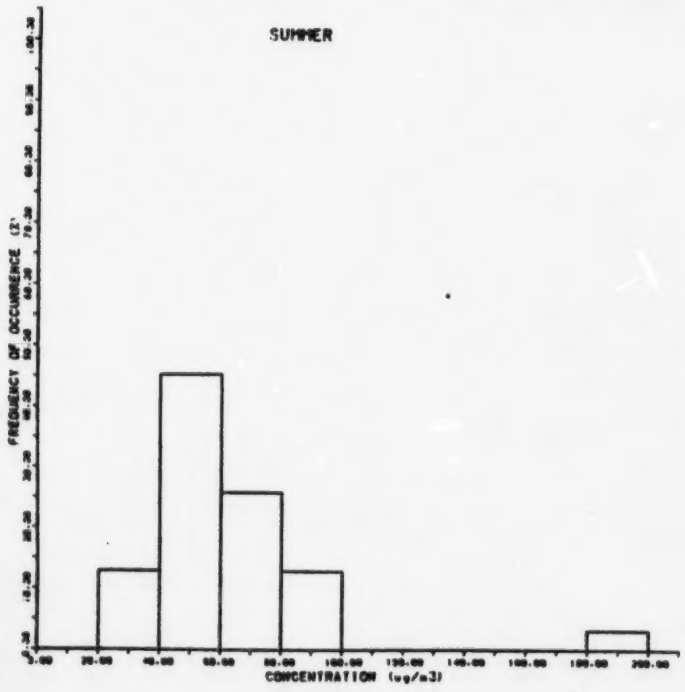


Figure 13
Seasonal Frequency Distribution of TSP for 1983







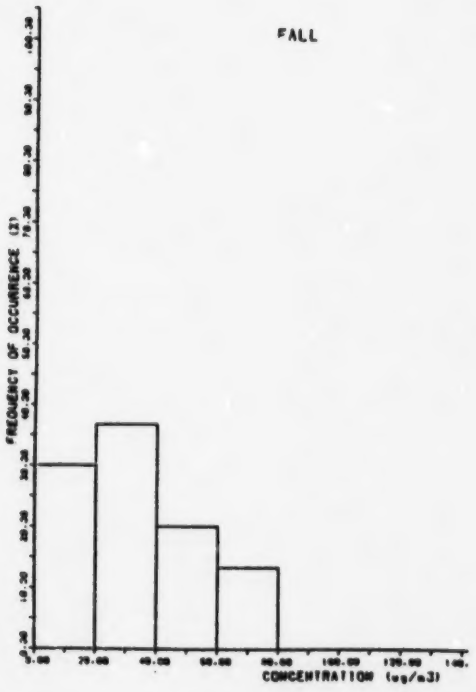


Figure 14

NEMP NETWORK TSP-
MEAN MONTHLY CONCENTRATIONS

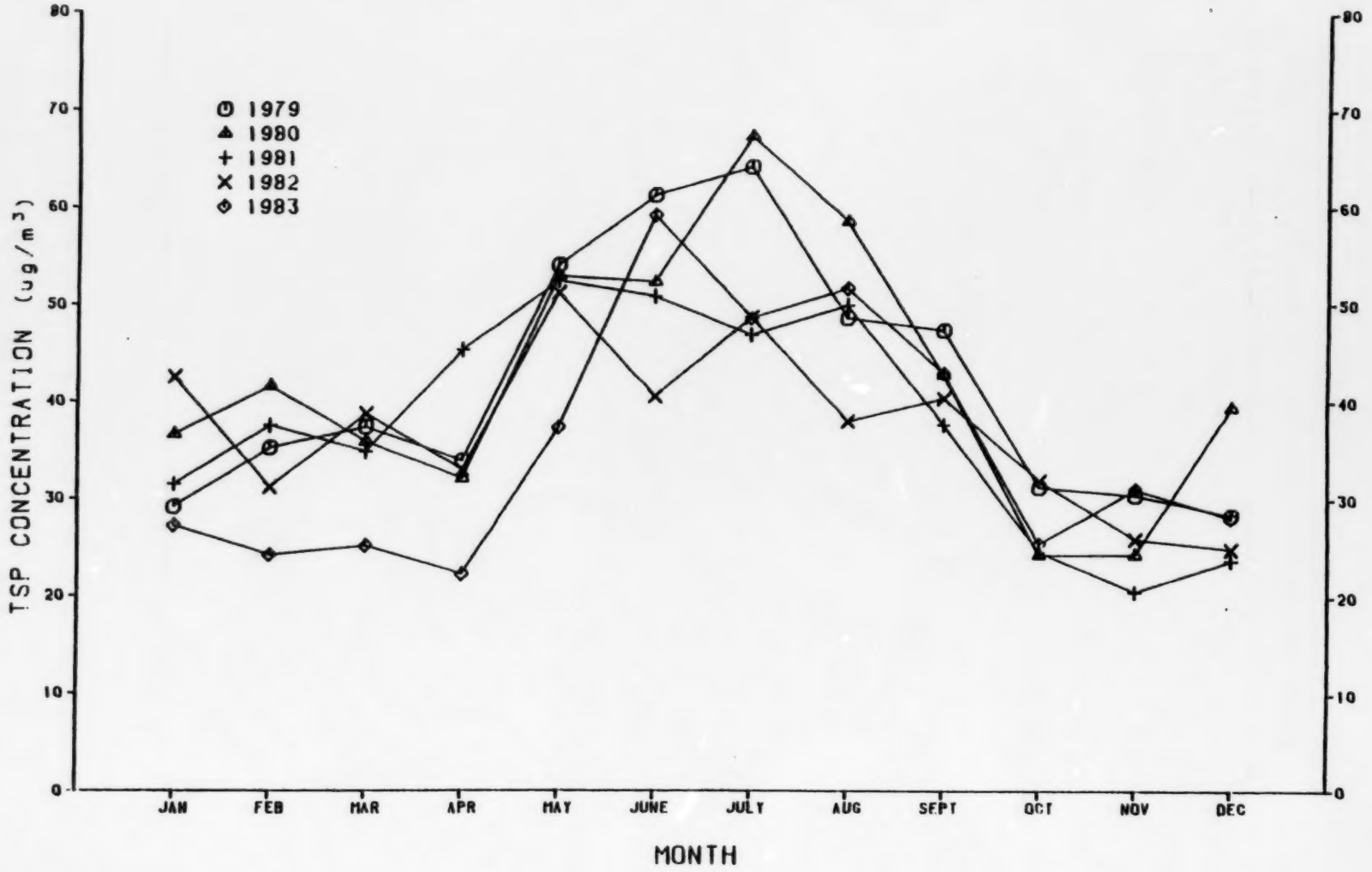
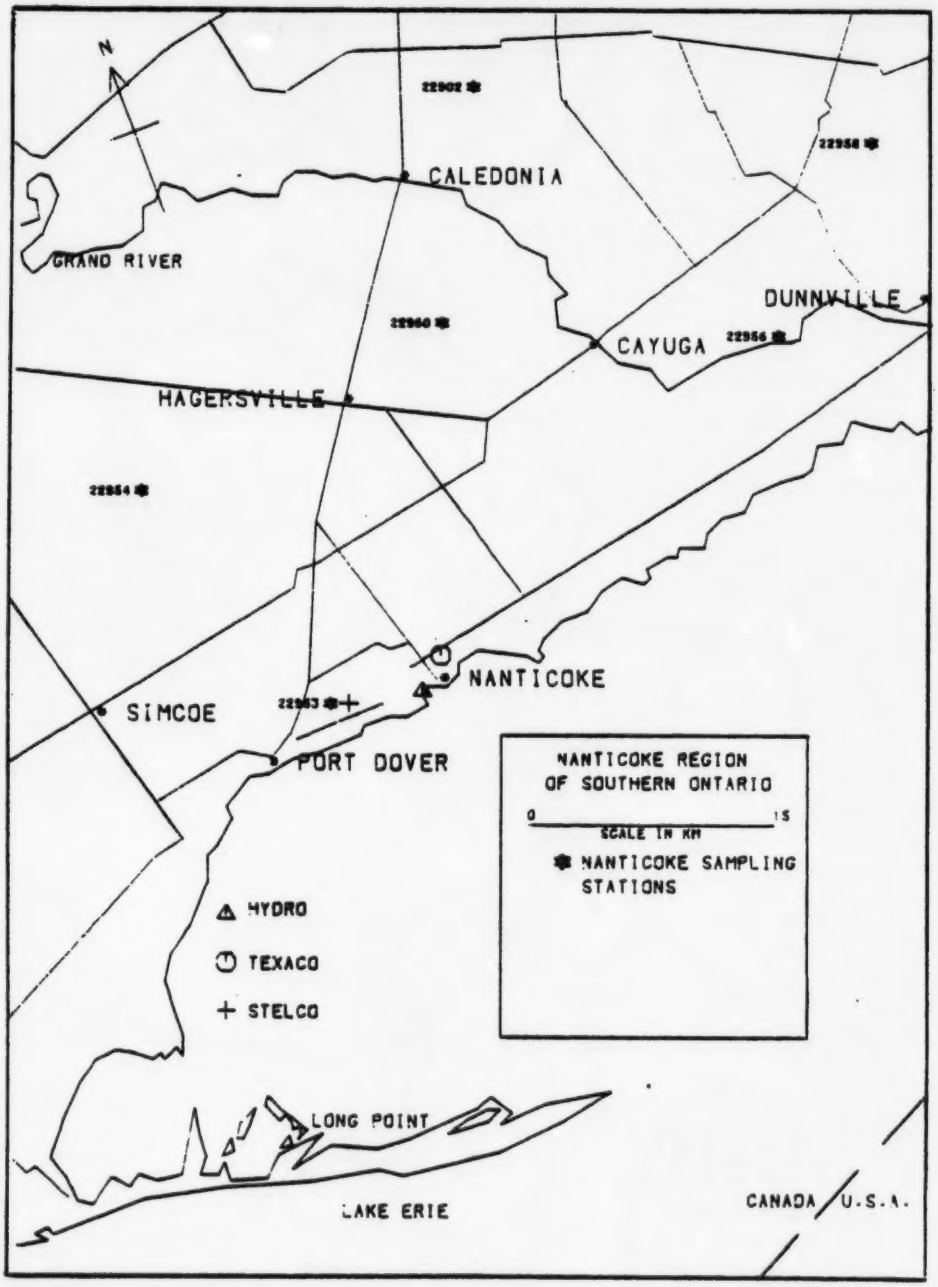


Figure 15

NEMP PRECIPITATION SAMPLING NETWORK



Appendix 1

NEMP PARTICULATES DATA COLLECTED DURING JANUARY TO DECEMBER 1983

Sampling dates were chosen according to the daily wind direction. Wind directions were obtained from the 10 m level of the Jarvis meteorological tower. The most frequent direction during the 24 hour sampling period was used. (N/A) corresponds to invalid or missing data while (BDL) represents concentrations reported as below the detection limit. Geometric means were not calculated for elements which reported in excess of 25% of the data below the detection limit. If less than 25 % of the data are below the detection limit then one half the value of the detection limit was used to calculate the geometric mean. All concentrations are expressed in ug/m^3 and are listed station by station.

It should be noted here that, due to the interference between nitric acid and free carbon (during laboratory analysis), the free carbon results and the free carbon to total carbon ratios are somewhat less than expected.

1988 Particulate Trace Metal Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22704	88/ 1/ 4	SW	.190	1.000	.001	.001	.006	.027	.255	.016	.002	.073	1.073	N/A
22704	88/ 1/12	NW	.208	.720	BDL	BDL	.012	.207	.290	.010	BDL	.007	.637	N/A
22704	88/ 2/29	NW	.087	.480	.001	BDL	.073	.110	.139	.010	BDL	.024	.480	N/A
22704	88/ 3/ 1	NE	.047	0.800	.000	.000	.104	1.240	.032	.007	BDL	.214	2.000	N/A
22704	88/ 3/21	NE	.748	0.840	.002	.000	.047	.772	1.020	.020	.007	.042	.365	N/A
22704	88/ 3/ 4	S	.270	1.440	.001	BDL	.019	.490	.046	.019	.007	.044	1.994	N/A
22704	88/ 4/11	S	.003	0.280	.002	.000	.276	1.330	.621	.051	BDL	.078	4.284	N/A
22704	88/ 4/29	NE	.480	1.480	.001	BDL	.006	.631	.304	.027	.004	.000	1.680	N/A
22704	88/ 7/11	SW	.197	1.610	.001	.001	.010	.710	.420	.006	BDL	.004	1.400	N/A
22704	88/ 7/20	SSW	.150	1.407	.001	.001	.008	.304	.404	.009	BDL	.040	1.200	N/A
22704	88/ 8/ 4	SW	.154	.721	.001	.002	.000	.474	.224	.021	BDL	.034	1.000	N/A
22704	88/ 8/22	NW	.140	.487	BDL	BDL	.000	.274	.246	.011	.003	.021	1.000	N/A
22704	88/ 9/21	WNW	.105	.909	BDL	.001	.002	.209	.000	.004	BDL	.010	.709	N/A
22704	88/10/ 3	SW	.279	1.400	.001	.001	.000	.716	.340	.009	BDL	.042	3.700	N/A
22704	88/10/ 9	NE	.027	.140	BDL	BDL	.002	.054	.041	.002	BDL	.011	.200	N/A
22704	88/10/21	NE	.101	1.140	BDL	.001	.000	.057	.304	.010	.000	.040	1.200	N/A
ARITH MEAN			.200	1.007	.001	.002	.042	.347	.406	.020	.004	.049	1.484	N/A
STD DEV			.221	.007	.001	.001	.099	.410	.254	.014	.002	.047	1.180	N/A
GEO MEAN			.204	1.000	.001	.001	.010	.109	.329	.017	.004	.034	1.098	N/A
MAXIMUM			.000	0.840	.000	.000	.017	1.330	1.020	.007	.007	.214	4.284	N/A
MINIMUM			.027	.140	.001	.001	.000	.054	.041	.002	.002	.007	.200	N/A
# OF SAMPLE			16	16	11	10	16	16	16	16	6	16	16	0

1988 Particulate Trace Metal Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22701	88/ 1/ 4	SW	.177	.940	.001	BDL	.013	.047	.384	.018	BDL	.076	1.177	N/A
22701	88/ 1/12	NW	.188	1.420	.001	BDL	.018	.204	.321	.011	BDL	.011	.629	N/A
22701	88/ 2/29	NW	.004	.184	BDL	BDL	.010	.006	.064	.003	BDL	.020	.325	N/A
22701	88/ 3/ 1	NE	.449	6.670	.000	.004	.041	2.670	.771	.100	.007	.270	2.373	N/A
22701	88/ 3/21	NE	.023	1.410	.001	BDL	.005	.048	.404	.019	.004	.027	1.000	N/A
22701	88/ 4/20	S	.180	.400	.001	BDL	.014	.010	.200	.002	.003	.040	.042	N/A
22701	88/ 5/ 4	S	.200	2.270	.001	.000	.010	.007	.002	.041	.006	.044	2.329	N/A
22701	88/ 5/20	SW	.304	3.030	BDL	BDL	.000	.405	.201	.014	BDL	.034	2.410	N/A
22701	88/ 6/ 5	SW	.110	.404	BDL	BDL	.010	.147	.140	.000	BDL	.040	.443	N/A
22701	88/ 6/11	S	.610	0.040	.001	.004	.044	1.000	.779	.033	BDL	.120	0.044	N/A
22701	88/ 6/29	NE	.107	.430	.001	BDL	.002	.140	.259	.010	BDL	.020	.704	N/A
22701	88/ 7/11	SW	.304	2.670	BDL	BDL	.044	.571	1.140	.010	BDL	.047	2.500	N/A
22701	88/ 7/20	SSW	.144	1.042	.001	BDL	.042	.471	.499	.029	BDL	.040	1.400	N/A
22701	88/ 8/ 4	SW	.111	.402	BDL	.000	.047	.270	.170	.007	BDL	.044	.000	N/A
22701	88/ 8/16	SSW	.204	2.204	.001	.000	.051	.432	.770	.009	BDL	.047	2.400	N/A
22701	88/ 8/22	NW	.002	.000	BDL	.002	.041	.244	.171	.004	.004	.020	.000	N/A
22701	88/ 9/ 9	SW	.040	1.110	BDL	BDL	.040	.401	.170	.014	BDL	.044	2.000	N/A
22701	88/ 9/21	WNW	.099	.042	BDL	.001	.044	.027	.000	.000	BDL	.012	.200	N/A
22701	88/10/ 3	SW	.577	2.402	.001	.000	.042	.754	1.000	.000	BDL	.007	5.100	N/A
22701	88/10/ 9	NE	.007	.004	BDL	.001	.014	.100	.073	.004	BDL	.014	.300	N/A
22701	88/10/21	NE	.000	1.047	BDL	.000	.007	.000	.014	.010	.004	.004	1.400	N/A
ARITH MEAN			.046	1.404	.001	.000	.020	.320	.470	.021	.005	.034	1.710	BDL
STD DEV			.167	1.010	.001	.001	.020	.341	.001	.002	.001	.007	1.302	BDL
GEO MEAN			.104	1.002	.001	.000	.027	.200	.044	.013	.005	.041	1.244	BDL
MAXIMUM			.610	6.670	.000	.004	.047	2.670	1.140	.100	.007	.270	5.100	BDL
MINIMUM			.007	.104	.001	.001	.005	.004	.004	.000	.004	.011	.300	BDL
# OF SAMPLE			21	21	11	10	21	21	21	21	6	21	21	0

N/A - data not available
BDL - below detection limit

1980 Particulate Trace Metal Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22930	03/ 1/ 6	SW	.180	.970	.001	.008	.181	.357	.136	.014	BDL	.008	.705	N/A
22930	03/ 1/12	NW	.119	.289	BDL	BDL	.009	.155	.152	.010	BDL	.006	.677	N/A
22930	03/ 2/20	NW	.094	.076	.001	.008	.648	.091	.065	.013	BDL	.020	.864	N/A
22930	03/ 3/ 1	NE	.084	.070	BDL	.008	.189	.072	.048	.007	.004	.022	.844	N/A
22930	03/ 3/31	NE	.084	.120	BDL	BDL	.706	.149	.096	.007	.004	.014	.638	N/A
22930	03/ 3/ 6	S	.191	.760	.008	.001	1.910	.296	.288	.014	.004	.030	1.314	N/A
22930	03/ 3/30	SW	.060	.140	.008	.007	1.770	.410	.108	.012	BDL	.025	2.046	N/A
22930	03/ 4/ 3	SW	.070	.090	.001	.001	1.170	.176	.058	.008	BDL	.044	.749	N/A
22930	03/ 4/11	S	.016	1.090	.001	BDL	2.010	.454	.049	.019	BDL	.030	2.108	N/A
22930	03/ 4/29	NE	.086	.480	.001	.004	.080	.157	.168	.009	.006	.027	.457	N/A
22930	03/ 7/11	SW	.104	.040	BDL	BDL	.076	.499	.190	.021	BDL	.023	.790	N/A
22930	03/ 7/25	SSW	.191	1.446	.001	.001	.070	.319	.078	.002	BDL	.044	1.250	N/A
22930	03/ 8/ 4	SW	.141	.200	.001	.001	.047	.249	.078	.000	BDL	.020	.000	N/A
22930	03/ 8/20	NW	.014	.380	.001	.001	.070	.307	.209	.012	BDL	.022	1.000	N/A
22930	03/ 9/ 9	SW	.056	.490	.001	.001	.010	.417	.157	.010	BDL	.047	2.400	N/A
22930	03/ 9/21	WNW	.146	.086	BDL	.001	.041	.164	.097	.000	BDL	.013	.300	N/A
22930	03/10/ 3	SW	.070	.486	BDL	.002	.021	.407	.177	.010	BDL	.026	2.200	N/A
22930	03/10/ 9	NE	.000	.180	BDL	BDL	.049	.069	.048	.003	BDL	.010	.190	N/A
22930	03/10/21	NE	.190	.509	BDL	BDL	.000	.104	.096	.007	.004	.020	.000	N/A
ARITH MEAN			.146	.540	.001	.002	.324	.204	.142	.012	.004	.020	1.186	N/A
STD DEV			.060	.324	.000	.002	.770	.141	.080	.005	.001	.017	.768	N/A
GEO MEAN			.120	.370	.001	.002	.150	.240	.120	.011	.004	.007	.060	N/A
MAXIMUM			.360	1.446	.002	.008	2.010	.319	.272	.002	.006	.000	2.046	N/A
MINIMUM			.000	.070	.001	.001	.010	.069	.048	.000	.004	.006	.190	N/A
# OF SAMPLE			19	19	11	13	19	19	19	19	5	19	19	0

1980 Particulate Trace Metal Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22930	03/ 1/ 6	SW	.119	.790	.001	.001	.172	.240	.110	.011	BDL	.047	.764	N/A
22930	03/ 1/12	NW	.116	.900	.001	BDL	.070	.120	.172	.007	BDL	.010	.670	N/A
22930	03/ 2/20	NW	.010	.150	.001	BDL	.000	.044	.040	.004	BDL	.019	.212	N/A
22930	03/ 3/ 1	NE	.170	2.520	.002	.002	.001	1.040	.417	.050	.000	.162	1.574	N/A
22930	03/ 3/31	NE	.127	.150	.001	.002	.010	.412	.094	.006	.005	.020	.096	N/A
22930	03/ 4/30	S	.070	.040	.001	BDL	.000	.015	.070	.010	.004	.007	.619	N/A
22930	03/ 5/ 6	S	.216	2.160	.001	BDL	.004	.000	.062	.000	BDL	.007	1.407	N/A
22930	03/ 5/30	SW	.467	.007	BDL	BDL	.040	.470	.164	.015	BDL	.015	2.912	N/A
22930	03/ 6/ 5	SW	.106	.420	BDL	BDL	.000	.220	.122	.011	BDL	.002	.751	N/A
22930	03/ 6/11	S	.204	2.420	.001	BDL	.170	.604	.209	.000	BDL	.071	2.464	N/A
22930	03/ 6/29	NE	.161	2.040	.001	BDL	.004	.106	.041	.002	BDL	.001	.973	N/A
22930	03/ 7/11	SW	.110	.420	BDL	BDL	.000	.270	.104	.011	BDL	.000	1.000	N/A
22930	03/ 7/20	SSW	.007	.000	BDL	.002	.120	.210	.040	.000	BDL	.041	.000	N/A
22930	03/ 8/ 4	SW	.117	.041	.001	.001	.107	.260	.100	.006	BDL	.002	.000	N/A
22930	03/ 8/16	SSW	.740	1.000	.001	.002	.007	.090	.045	.002	.000	.004	1.600	N/A
22930	03/ 8/22	NW	.179	.060	BDL	BDL	.067	.444	.200	.017	BDL	.002	.700	N/A
22930	03/ 9/ 9	SW	.067	.770	BDL	BDL	.040	.400	.094	.019	BDL	.049	2.600	N/A
22930	03/10/ 3	SW	.070	1.007	BDL	.001	.017	.094	.066	.000	BDL	.009	2.100	N/A
22930	03/10/ 9	NE	.000	.192	BDL	BDL	.017	.120	.054	.003	BDL	.012	.000	N/A
22930	03/10/21	NE	.000	1.407	BDL	.001	.015	.071	.040	.010	.004	.009	1.400	N/A
ARITH MEAN			.001	.900	.001	.001	.040	.417	.006	.017	.000	.040	1.079	BDL
STD DEV			.160	.749	BDL	.001	.047	.000	.121	.010	.002	.000	.000	BDL
GEO MEAN			.121	.704	.001	.001	.040	.001	.190	.015	.005	.000	1.000	BDL
MAXIMUM			.740	2.000	.002	.002	.172	1.040	.400	.000	.000	.162	2.100	BDL
MINIMUM			.000	.150	.001	.001	.010	.044	.040	.000	.000	.010	.212	BDL
# OF SAMPLE			20	20	11	0	20	20	20	20	5	20	20	0

N/A - data not available
BDL - below detection limit

1980 Particulate Trace Metal Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22755	80/ 1/ 6	SW	.184	.750	.001	BDL	.044	.273	.151	.010	BDL	.070	.700	N/A
22755	80/ 1/12	NW	.170	1.400	.001	BDL	.031	.140	.390	.007	BDL	.010	.706	N/A
22755	80/ 2/29	NW	.027	.000	BDL	BDL	.007	.044	.071	.004	BDL	.010	.144	N/A
22755	80/ 3/ 1	NE	.426	4.610	.001	BDL	.104	1.200	1.310	.050	BDL	.104	2.002	N/A
22755	80/ 3/31	NE	.021	2.000	BDL	BDL	.044	.077	.746	.019	BDL	.040	1.102	N/A
22755	80/ 4/30	S	.137	.000	.001	BDL	.040	.090	.104	.007	BDL	.000	.472	N/A
22755	80/ 5/ 6	S	.092	1.090	BDL	BDL	.104	.421	.099	.013	.004	.050	1.014	N/A
22755	80/ 5/30	SW	.415	.001	BDL	BDL	.050	.400	.151	.010	BDL	.010	.710	N/A
22755	80/ 6/ 5	SW	.100	.006	.001	.007	.176	.290	.117	.000	BDL	.000	2.052	N/A
22755	80/ 6/11	S	.041	1.400	.001	BDL	.104	.470	.404	.017	BDL	.004	1.070	N/A
22755	80/ 6/29	NE	.027	.054	BDL	BDL	.140	.074	.009	.012	BDL	.046	1.750	N/A
22755	80/ 7/11	SW	.102	1.000	BDL	BDL	.217	.343	.464	.012	BDL	.004	1.300	N/A
22755	80/ 7/29	SSW	.100	.004	BDL	BDL	.027	.020	.277	.011	BDL	.044	1.200	N/A
22755	80/ 8/ 4	SW	.077	.101	BDL	.001	.050	.100	.074	.000	BDL	.000	.400	N/A
22755	80/ 8/14	SSW	.147	.400	.001	.000	.071	.440	.137	.007	BDL	.040	1.400	N/A
22755	80/ 8/22	NW	.090	.007	BDL	BDL	.170	.133	.100	.004	.004	.007	.400	N/A
22755	80/ 9/ 9	SW	.005	.412	BDL	.001	.140	.400	.210	.017	BDL	.047	2.700	N/A
22755	80/ 9/21	WNW	.071	.140	BDL	BDL	.120	.054	.040	.000	BDL	.010	.000	N/A
22755	80/10/ 3	SW	.099	.779	.001	.002	.104	.324	.220	.000	BDL	.040	2.000	N/A
22755	80/10/ 9	NE	.047	.220	BDL	.000	.197	.070	.071	.000	BDL	.010	.000	N/A
22755	80/10/21	NE	.177	.074	BDL	.001	.170	.240	.410	.011	.004	.040	1.100	N/A
ARITH MEAN			.107	.700	.001	.002	.147	.342	.209	.010	.005	.046	1.404	N/A
STD DEV			.109	.761	.000	.002	.074	.264	.201	.011	.001	.007	.704	N/A
GEO MEAN			.147	.400	.001	.002	.126	.262	.202	.010	.005	.006	1.005	BDL
MAXIMUM			.426	4.610	.001	.007	.307	1.200	1.310	.050	.004	.104	2.052	N/A
MINIMUM			.027	.101	.001	.001	.007	.044	.040	.002	.004	.010	.144	N/A
# OF SAMPLE			21	21	0	7	21	21	21	21	2	21	21	0

1980 Particulate Trace Metal Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22757	80/ 1/ 6	SW	.171	1.670	.001	BDL	.011	.040	.000	.011	BDL	.044	.997	N/A
22757	80/ 1/12	NW	.170	1.400	BDL	BDL	.004	.176	.374	.007	BDL	.010	.977	N/A
22757	80/ 2/29	NW	.000	.004	BDL	BDL	.004	.007	.190	.000	BDL	.010	.179	N/A
22757	80/ 3/ 1	NE	.001	0.720	.001	BDL	.000	1.000	.716	.000	BDL	.170	2.047	N/A
22757	80/ 4/30	S	.171	.700	BDL	BDL	.010	.000	.070	.010	BDL	.040	.700	N/A
22757	80/ 5/ 6	S	.007	2.040	BDL	BDL	.021	.410	1.000	.016	BDL	.057	2.127	N/A
22757	80/ 5/30	SW	.000	1.000	BDL	BDL	.000	.041	.027	.010	BDL	.010	4.000	N/A
22757	80/ 6/ 5	SW	.000	0.000	.004	BDL	.007	.740	1.400	.007	BDL	.000	1.010	N/A
22757	80/ 6/11	S	.004	1.020	BDL	BDL	.027	.407	.000	.017	BDL	.044	4.041	N/A
22757	80/ 6/29	NE	.100	.707	.001	BDL	.047	.000	.021	.000	BDL	.007	.720	N/A
22757	80/ 7/11	SW	.040	0.707	BDL	BDL	.000	.077	0.004	.002	BDL	.000	0.000	N/A
22757	80/ 7/29	SSW	.110	1.700	.001	BDL	.040	.074	.000	.010	BDL	.040	1.700	N/A
22757	80/ 8/ 4	SW	.120	.070	.001	BDL	.007	.057	.100	.007	BDL	.040	.000	N/A
22757	80/ 8/14	SSW	.004	2.010	.001	.001	.040	.400	1.120	.012	BDL	.070	2.000	N/A
22757	80/ 8/22	NW	.010	.477	BDL	BDL	.007	.177	.207	.007	.007	.040	.700	N/A
22757	80/ 9/ 9	SW	.400	2.077	.001	.001	.027	.720	1.740	.005	BDL	.002	2.000	N/A
22757	80/ 9/21	WNW	.000	.004	BDL	.000	.004	.107	.107	.000	BDL	.000	.400	N/A
22757	80/10/ 3	SW	.070	2.707	.001	.000	.013	.721	1.004	.000	BDL	.000	4.700	N/A
22757	80/10/ 9	NE	.044	.000	BDL	BDL	.001	.077	.107	.000	BDL	.010	.400	N/A
22757	80/10/21	NE	.000	1.000	BDL	.000	.004	.007	.407	.010	.004	.001	1.000	N/A
ARITH MEAN			.040	1.720	.001	.000	.004	.400	.734	.010	.004	.007	1.007	N/A
STD DEV			.101	1.100	.000	.001	.001	.001	.007	.011	.001	.007	1.404	N/A
GEO MEAN			.104	1.000	.001	.000	.004	.000	.000	.011	.005	.000	1.001	N/A
MAXIMUM			.000	0.707	.001	.000	.007	1.000	2.004	.000	.007	.170	4.700	N/A
MINIMUM			.000	.004	.001	.001	.004	.007	.100	.000	.004	.000	.179	N/A
# OF SAMPLE			20	20	9	0	20	20	20	20	2	20	20	0

N/A - data not available
BDL - below detection limit

1988 Particulate Trace Metal Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22959	88/ 1/ 6	SW	.172	.700	.001	BDL	.019	.095	129	.012	BDL	.042	1.967	N/A
22959	88/ 1/12	NW	.101	.600	.001	BDL	.041	.154	.135	.006	BDL	BDL	.722	N/A
22959	88/ 2/29	NW	.004	.060	BDL	BDL	.004	.041	.030	BDL	BDL	.015	.217	N/A
22959	88/ 3/ 1	NE	.249	2.040	.002	BDL	.259	1.070	.440	.030	.000	.167	1.934	N/A
22959	88/ 3/31	NE	.020	1.400	.001	BDL	.013	.419	.004	.010	.004	.004	1.000	N/A
22959	88/ 4/30	S	.102	1.000	BDL	BDL	.012	.200	.044	.013	BDL	.027	1.123	N/A
22959	88/ 5/ 6	S	.019	0.900	BDL	BDL	.044	.140	.404	.017	BDL	.027	2.101	N/A
22959	88/ 5/30	SW	.400	.077	BDL	BDL	.003	.044	.157	.010	BDL	.011	0.040	N/A
22959	88/ 6/ 5	SW	.040	.670	.001	.009	.015	.412	.109	.014	BDL	.044	1.092	N/A
22959	88/ 6/11	S	.407	2.710	.001	BDL	.130	.673	.464	.020	BDL	.074	0.240	N/A
22959	88/ 6/29	NE	.150	1.570	.001	BDL	.009	.309	.300	.013	.000	.000	.941	N/A
22959	88/ 7/11	SW	.140	1.200	.001	.001	.005	.441	.361	.010	BDL	.007	1.000	N/A
22959	88/ 7/29	SSW	.100	.606	BDL	BDL	.042	.027	.091	.000	BDL	.046	1.100	N/A
22959	88/ 8/ 4	SW	.004	.047	BDL	.002	.002	.230	.129	.000	.000	.002	1.000	N/A
22959	88/ 8/16	SSW	.419	1.176	.001	.003	.040	.645	.290	.017	.004	.043	2.000	N/A
22959	88/ 8/22	NW	.150	.766	BDL	BDL	.077	.021	.170	.009	BDL	.025	.700	N/A
22959	88/ 9/ 9	SW	.004	.942	.001	.001	.007	.544	.277	.002	.000	.049	2.600	N/A
22959	88/ 9/21	WNW	.094	.270	BDL	BDL	.009	.099	.069	.000	BDL	.004	.490	N/A
22959	88/10/ 3	SW	.440	1.216	.001	.002	.004	.670	.210	.020	BDL	.040	4.200	N/A
22959	88/10/ 9	NE	.076	.040	BDL	.001	.004	.202	.079	.007	BDL	.010	.300	N/A
22959	88/10/21	NE	.194	1.779	BDL	.002	.004	.042	.064	.012	.004	.004	1.000	N/A
ARITH MEAN			.240	1.004	.001	.000	.040	.406	.207	.013	.004	.042	1.347	N/A
STD DEV			.150	.440	.000	.000	.033	.204	.126	.012	.000	.004	1.041	N/A
GEO MEAN			.200	.006	.001	.000	.007	.007	.211	.011	.004	.021	1.209	N/A
MAXIMUM			.610	0.710	.002	.009	.207	1.070	.440	.030	.000	.167	4.200	N/A
MINIMUM			.004	.070	.001	.001	.004	.041	.030	.000	.000	.004	.217	N/A
# OF SAMPLE			21	21	11	0	21	21	21	21	7	21	21	0

1989 Particulate Trace Metal Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N-	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22961	88/ 1/ 6	SW	.200	2.300	.001	BDL	.007	.442	.423	.002	.004	.007	1.514	N/A
22961	88/ 1/12	NW	.247	2.329	BDL	BDL	.020	.245	.430	.007	BDL	.010	.720	N/A
22961	88/ 2/29	NW	.041	.727	BDL	BDL	.023	.204	.214	.002	BDL	.012	.303	N/A
22961	88/ 3/ 1	NE	.270	2.270	.001	BDL	.046	1.040	.754	.050	BDL	.150	2.120	N/A
22961	88/ 3/31	NE	.174	1.990	.001	BDL	.000	.415	.411	.005	BDL	.000	1.139	N/A
22961	88/ 4/30	S	.147	1.040	.001	BDL	.050	.720	.273	.000	FAL	.047	.040	N/A
22961	88/ 5/ 6	S	.045	0.200	BDL	BDL	.104	.330	.312	.001	.004	.050	0.130	N/A
22961	88/ 5/30	SW	.711	4.000	.001	BDL	.025	1.700	.072	.134	BDL	.027	4.050	N/A
22961	88/ 6/ 5	SW	.011	3.910	.000	BDL	.030	2.400	.706	.100	.004	.004	1.970	N/A
22961	88/ 6/11	S	.534	5.190	.001	BDL	.007	1.700	.942	.101	BDL	.100	0.741	N/A
22961	88/ 6/29	NE	.140	1.560	BDL	BDL	.012	.300	.400	.004	BDL	.021	.959	N/A
22961	88/ 7/11	SW	.250	6.002	.001	.004	.044	2.140	1.473	.147	BDL	.051	0.100	N/A
22961	88/ 7/29	SSW	.170	0.256	.001	.001	.047	1.225	.699	.025	BDL	.041	1.000	N/A
22961	88/ 8/ 4	SW	.196	0.047	BDL	.004	.002	1.130	.400	.100	BDL	.046	1.000	N/A
22961	88/ 8/16	SSW	.027	0.044	.001	.000	.044	1.007	.417	.050	BDL	.049	0.200	N/A
22961	88/ 8/22	NW	.130	1.000	BDL	.002	.014	.207	.000	.000	BDL	.000	.700	N/A
22961	88/ 9/ 9	SW	.076	0.101	.001	.000	.014	0.006	1.125	.150	BDL	.072	0.700	N/A
22961	88/ 9/21	WNW	.127	1.704	BDL	BDL	.000	.000	.371	.006	BDL	.010	.700	N/A
22961	88/10/ 3	SW	.551	6.406	.001	.000	.010	0.409	1.007	.210	.010	.070	5.200	N/A
22961	88/10/ 9	NE	.007	.270	BDL	BDL	BDL	.109	.004	.004	BDL	.011	.200	N/A
22961	88/10/21	NE	.190	1.405	BDL	.001	.004	.009	.404	.009	.005	.004	1.100	N/A
ARITH MEAN			.260	2.941	.001	.000	.040	1.144	.443	.071	.004	.000	1.040	N/A
STD DEV			.165	1.021	.000	.000	.004	.740	.300	.037	.004	.004	1.000	N/A
GEO MEAN			.213	2.040	.001	.000	.004	.004	.540	.050	.003	.040	1.404	N/A
MAXIMUM			.711	6.406	.000	.000	.156	0.409	1.473	.213	.010	.150	5.200	N/A
MINIMUM			.007	.270	.001	.001	.004	.109	.004	.004	.004	.011	.250	N/A
# OF SAMPLE			21	21	10	0	21	21	21	21	5	21	21	0

N/A - data not available
BDL - below detection limit

1980 Particulate Trace Metal Data (ng/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	AL	CA	CD	CR	CU	FE	MG	MN	NI	PB	SI	ZN
22760	08/ 1/ 4	SW	.010	1.950	.001	BDL	.009	.548	.308	.001	.004	.007	1.846	N/A
22760	08/ 1/10	NW	.194	.729	BDL	BDL	.007	.187	.044	.007	BDL	BDL	1.008	N/A
22760	08/ 2/25	NW	.004	.361	BDL	BDL	.006	.097	.074	.005	BDL	.007	.804	N/A
22760	08/ 3/ 1	NE	.002	2.540	.001	BDL	.020	1.480	.681	.040	.004	.179	1.098	N/A
22760	08/ 3/21	NE	.170	1.010	BDL	BDL	BDL	.321	.300	.017	BDL	.006	1.021	N/A
22760	08/ 4/20	S	.195	.572	.001	BDL	.006	.200	.170	.014	.006	.021	.792	N/A
22760	08/ 5/ 6	S	.290	6.250	.001	BDL	.040	2.150	1.000	.110	.008	.091	2.727	N/A
22760	08/ 5/20	SW	.020	1.010	BDL	BDL	.006	.090	.210	.019	BDL	.021	4.207	N/A
22760	08/ 6/ 3	SW	.177	1.420	BDL	BDL	.006	.449	.204	.021	BDL	.057	1.179	N/A
22760	08/ 6/11	S	.711	8.420	.001	BDL	.020	2.290	1.410	.180	BDL	.197	6.640	N/A
22760	08/ 6/29	NE	.146	.707	BDL	BDL	.000	.041	.001	.014	BDL	.016	.766	N/A
22760	08/ 7/11	SW	.196	4.080	BDL	BDL	.024	.420	.704	.021	BDL	.030	1.000	N/A
22760	08/ 7/23	SSW	.240	2.514	.001	.000	.027	1.147	.504	.040	BDL	.040	1.400	N/A
22760	08/ 8/ 4	SW	.110	.000	BDL	BDL	.004	.201	.175	.015	BDL	.009	1.000	N/A
22760	08/ 8/16	SSW	.010	4.000	BDL	.000	.004	1.010	1.046	.109	BDL	.022	3.600	N/A
22760	08/ 8/22	NW	.196	.009	BDL	BDL	.006	.000	.046	.010	BDL	.009	1.100	N/A
22760	08/ 9/21	WNW	.090	.305	BDL	BDL	.010	.027	.129	.010	BDL	.011	.500	N/A
22760	08/10/ 3	SW	.071	4.767	.001	.001	.012	.704	.402	.027	BDL	.040	4.300	N/A
22760	08/10/ 9	NE	BDL	.171	BDL	BDL	.002	.001	.045	.004	BDL	.014	.199	N/A
ARITH MEAN			.227	2.447	.001	.000	.021	.706	.467	.030	.004	.046	1.073	N/A
STD DEV			.181	2.309	.000	.001	.017	.641	.377	.030	.001	.048	1.663	N/A
GEO MEAN			.164	1.588	.001	.000	.014	.405	.300	.004	.004	.020	1.045	N/A
MAXIMUM			.711	8.420	.001	.000	.004	2.290	1.410	.180	.000	.197	6.640	N/A
MINIMUM			.000	.171	.001	.001	.002	.001	.045	.004	.004	.004	.199	N/A
# OF SAMPLE			19	19	7	0	19	19	19	19	4	19	19	0

N/A - data not available
BDL - below detection limit

1988 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22904	88/ 1/ 6	SW	.2500	.0100	17.8000	4.5000	BDL	8.4000
22904	88/ 1/12	NW	.3700	.0100	1.0000	.4000	BDL	.6000
22904	88/ 2/23	NW	.1600	.0100	5.6000	1.5000	BDL	2.4000
22904	88/ 3/ 1	NE	1.0500	.0200	15.2000	10.4000	BDL	9.7000
22904	88/ 3/31	NE	.1800	.0100	.1000	BDL	BDL	.2000
22904	88/ 5/ 6	S	.1400	.0100	4.0000	3.1000	BDL	2.7000
22904	88/ 6/11	S	.1100	.0100	19.4000	7.0000	BDL	11.0000
22904	88/ 6/29	NE	.2600	.0100	3.2000	2.7000	BDL	1.0000
22904	88/ 7/11	SW	1.2000	BDL	1.4000	2.6000	BDL	4.7000
22904	88/ 7/29	SSW	1.3000	BDL	1.5000	5.0000	BDL	3.7000
22904	88/ 8/ 4	SW	1.7000	BDL	2.8000	1.3000	BDL	9.7000
22904	88/ 8/22	NW	.6000	BDL	3.1000	2.6000	BDL	11.5000
22904	88/ 9/21	WNW	.4000	BDL	.8000	1.1000	BDL	2.3000
22904	88/10/ 3	SW	.7000	BDL	4.2000	4.0000	BDL	17.1000
22904	88/10/ 9	NE	.7000	BDL	.5000	.8000	BDL	1.0000
22904	88/10/21	NE	1.0000	BDL	1.0000	5.0000	BDL	1.8000
ARITH MEAN			.6825	.0113	4.6875	3.2781	BDL	5.3875
STD DEV			.4729	.0033	5.4159	2.6393	BDL	4.8863
GEO MEAN			.4540	.0109	2.3218	2.0674	BDL	3.1905
MAXIMUM			1.7000	.0200	17.8000	10.4000	BDL	17.1000
MINIMUM			.1100	.0100	.1000	.0500	BDL	.2000
# OF SAMPLE			16	8	16	16	16	16

1988 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22951	88/ 1/ 6	SW	.2600	.0100	13.4000	6.8000	BDL	7.7000
22951	88/ 1/12	NW	.4500	.0100	.1000	.4000	BDL	1.0000
22951	88/ 2/23	NW	BDL	.0100	3.6000	.9000	BDL	2.1000
22951	88/ 3/ 1	NE	1.3000	.0700	15.0000	9.9000	BDL	20.5000
22951	88/ 3/31	NE	.3300	.0100	4.0000	1.9000	BDL	2.6000
22951	88/ 4/30	S	.1800	.0100	8.8000	4.0000	BDL	5.5000
22951	88/ 5/ 6	S	.2300	.0100	6.0000	4.5000	BDL	3.6000
22951	88/ 5/30	SW	.0400	.0100	6.2000	2.3000	BDL	3.5000
22951	88/ 6/ 5	SW	.0300	.0100	15.2000	5.0000	BDL	8.6000
22951	88/ 6/11	S	.2100	.0200	17.0000	7.4000	BDL	12.1000
22951	88/ 6/29	NE	.1200	.0100	2.6000	1.8000	BDL	.9000
22951	88/ 7/11	SW	1.3000	BDL	1.4000	1.7000	BDL	3.2000
22951	88/ 7/29	SSW	1.3000	BDL	1.5000	3.4000	BDL	4.5000
22951	88/ 8/ 4	SW	.3000	BDL	4.6000	3.8000	BDL	15.7000
22951	88/ 8/16	SSW	.6000	BDL	5.6000	5.7000	BDL	23.6000
22951	88/ 8/22	NW	.3000	BDL	2.8000	2.0000	BDL	10.0000
22951	88/ 9/ 9	SW	.4000	BDL	4.5000	4.8000	BDL	11.8000
22951	88/ 9/21	WNW	.4000	BDL	.5000	.6000	BDL	1.3000
22951	88/10/ 3	SW	.8000	BDL	4.6000	3.8000	BDL	15.6000
22951	88/10/ 9	NE	.9000	BDL	.4000	.7000	BDL	1.4000
22951	88/10/21	NE	1.0000	BDL	1.2000	4.2000	BDL	1.6000
ARITH MEAN			.5149	.0164	5.6667	3.6952	BDL	7.3714
STD DEV			.4149	.0172	5.0976	2.4998	BDL	6.5841
GEO MEAN			.2781	.0127	3.5234	2.7305	BDL	4.8408
MAXIMUM			1.3000	.0700	17.0000	9.9000	BDL	23.6000
MINIMUM			.0850	.0100	.1000	.4000	BDL	.9000
# OF SAMPLE			21	11	21	21	21	21

BDL - below detection limit

1983 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22952	83/ 1/ 6	SW	.2400	.0100	12.6000	5.8000	BDL	7.7000
22952	83/ 1/12	NW	.3500	.0100	1.6000	.1000	BDL	1.3000
22952	83/ 2/23	NW	.0700	.0100	5.0000	1.7000	BDL	2.6000
22952	83/ 3/31	NE	.3000	.0100	4.0000	2.0000	BDL	2.9000
22952	83/ 4/30	S	.1300	.0100	8.0000	3.0000	BDL	4.6000
22952	83/ 5/ 6	S	.1100	.0100	5.8000	2.7000	BDL	3.1000
22952	83/ 5/30	SW	.1400	.0100	5.2000	1.7000	BDL	3.3000
22952	83/ 6/ 5	SW	.0200	.0100	12.4000	2.6000	BDL	9.3000
22952	83/ 6/11	S	.1000	.0100	10.6000	4.5000	BDL	7.7000
22952	83/ 6/29	NE	.1300	.0100	3.8000	2.0000	BDL	2.0000
22952	83/ 7/11	SW	1.1000	BDL	.9000	1.8000	BDL	3.8000
22952	83/ 7/23	SSW	1.2000	BDL	1.0000	3.1000	BDL	3.1000
22952	83/ 8/ 4	SW	.4000	BDL	4.3000	.4000	BDL	14.6000
22952	83/ 8/22	NW	.4000	BDL	2.9000	1.8000	BDL	10.2000
22952	83/ 9/ 9	SW	.2000	BDL	3.7000	.8000	BDL	13.7000
22952	83/ 9/21	WNW	.3000	BDL	.9000	1.1000	BDL	2.8000
22952	83/10/ 3	SW	.7000	BDL	3.9000	1.0000	BDL	14.5000
22952	83/10/ 9	NE	.7000	BDL	.4000	.3000	BDL	1.2000
22952	83/10/21	NE	1.1000	BDL	1.2000	3.8000	BDL	1.5000
ARITH MEAN			.4158	.0100	4.5474	2.2210	BDL	5.8895
STD DEV			.3674	.0000	3.7827	1.6644	BDL	4.7118
GEO MEAN			.2628	.0100	3.1071	1.5410	BDL	4.2849
MAXIMUM			1.2000	.0100	12.6000	6.5000	BDL	14.6000
MINIMUM			.0200	.0100	.4000	.1000	BDL	1.2000
# OF SAMPLE			19	18	19	19	19	19

1983 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22953	83/ 1/ 6	SW	.2100	.0100	13.0000	4.3000	BDL	7.4000
22953	83/ 1/12	NW	.4900	.0100	.1000	.1000	BDL	.9000
22953	83/ 2/23	NW	.1200	.0100	4.2000	1.3000	BDL	2.4000
22953	83/ 3/ 1	NE	.0700	.0200	13.4000	8.1000	BDL	11.4000
22953	83/ 3/31	NE	.4100	.0300	3.4000	1.6000	BDL	2.9000
22953	83/ 4/30	S	.1000	.0100	7.0000	3.6000	BDL	4.9000
22953	83/ 5/ 6	S	.2400	.0300	3.0000	2.7000	BDL	3.0000
22953	83/ 5/30	SW	.1400	.0100	4.0000	1.9000	BDL	3.0000
22953	83/ 6/ 5	SW	.0800	.0100	11.6000	1.3000	BDL	10.1000
22953	83/ 6/11	S	.1300	.0100	10.0000	3.8000	BDL	9.6000
22953	83/ 6/29	NE	.3500	.0400	1.0000	1.9000	BDL	1.4000
22953	83/ 7/11	SW	1.4000	BDL	1.2000	1.5000	BDL	3.7000
22953	83/ 7/23	SSW	1.4000	BDL	.9000	2.2000	BDL	2.6000
22953	83/ 8/ 4	SW	.7000	BDL	4.1000	1.6000	BDL	14.6000
22953	83/ 8/16	SSW	.6000	BDL	4.5000	.1000	BDL	21.2000
22953	83/ 8/22	NW	1.1000	BDL	2.7000	1.3000	BDL	11.2000
22953	83/ 9/ 9	SW	.4000	BDL	3.5000	3.0000	BDL	11.9000
22953	83/10/ 3	SW	.9000	BDL	4.1000	2.3000	BDL	14.3000
22953	83/10/ 9	NE	1.0000	BDL	.4000	.5000	BDL	1.0000
22953	83/10/21	NE	1.1000	BDL	.9000	5.1000	BDL	2.3000
ARITH MEAN			.5910	.0173	4.6300	2.4900	BDL	6.9900
STD DEV			.4274	.0105	4.0713	1.9710	BDL	5.5746
GEO MEAN			.4257	.0149	2.7483	1.6334	BDL	4.7950
MAXIMUM			1.4000	.0400	13.4000	8.1000	BDL	21.2000
MINIMUM			.0000	.0100	.1000	.1000	BDL	.9000
# OF SAMPLE			20	11	20	20	20	20

BDL - below detection limit

1988 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22955	88/ 1/ 6	SW	.1700	.0100	12.4000	5.8000	BDL	7.9000
22955	88/ 1/12	NW	.3700	.0100	.1000	.4000	BDL	1.3000
22955	88/ 2/23	NW	.0200	.0100	3.0000	.8000	BDL	1.7000
22955	88/ 3/ 1	NE	.7000	.0300	14.8000	9.4000	BDL	8.4000
22955	88/ 3/31	NE	.3500	.0200	4.0000	1.4000	BDL	2.4000
22955	88/ 4/30	S	.1400	.0100	4.8000	2.7000	BDL	3.9000
22955	88/ 5/ 6	S	.1000	.0100	4.2000	2.5000	BDL	3.1000
22955	88/ 5/30	SW	.1100	.0100	4.7000	1.5000	BDL	3.1000
22955	88/ 6/ 5	SW	.0800	.0100	13.2000	3.2000	BDL	8.8000
22955	88/ 6/11	S	.1900	.0100	15.2000	6.8000	BDL	10.3000
22955	88/ 6/29	NE	.2000	.0100	2.6000	1.3000	BDL	1.1000
22955	88/ 7/11	SW	1.4000	BDL	1.9000	3.6000	BDL	5.3000
22955	88/ 7/28	SSW	1.4000	BDL	1.3000	2.8000	BDL	3.4000
22955	88/ 8/ 4	SW	.7000	BDL	4.2000	2.7000	BDL	13.4000
22955	88/ 8/14	SSW	.6000	BDL	5.0000	.1000	BDL	20.6000
22955	88/ 8/22	NW	.7000	BDL	5.2000	1.8000	BDL	10.8000
22955	88/ 9/ 9	SW	.3000	BDL	3.9000	3.1000	BDL	12.6000
22955	88/ 9/21	WNW	.4000	BDL	.6000	.7000	BDL	1.4000
22955	88/10/ 3	SW	.8000	BDL	4.1000	1.7000	BDL	17.4000
22955	88/10/ 9	NE	1.0000	BDL	.4000	.5000	BDL	1.0000
22955	88/10/21	NE	1.1000	BDL	1.1000	4.1000	BDL	1.7000
ARITH MEAN			.5210	.0127	5.0809	2.7284	BDL	6.6476
STD DEV			.4294	.0042	4.6065	2.2695	BDL	5.4148
GEO MEAN			.3284	.0118	3.0046	1.8238	BDL	4.4242
MAXIMUM			1.4000	.0300	15.2000	9.4000	BDL	20.6000
MINIMUM			.0200	.0100	.1000	.1000	BDL	1.0000
# OF SAMPLE			21	11	21	21	21	21

1989 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22957	89/ 1/ 6	SW	.2600	.0100	14.0000	4.3000	BDL	9.3000
22957	89/ 1/12	NW	.5200	.0100	1.2000	BDL	BDL	1.4000
22957	89/ 2/23	NW	.1100	.0100	3.8000	.9000	BDL	2.2000
22957	89/ 3/ 1	NE	.9900	.0300	14.2000	9.1000	BDL	8.7000
22957	89/ 4/30	S	.1900	.0100	8.8000	3.3000	BDL	4.9000
22957	89/ 5/ 6	S	.1300	.0100	5.0000	2.7000	BDL	3.0000
22957	89/ 5/30	SW	.3300	.0100	5.4000	1.7000	BDL	3.3000
22957	89/ 6/ 5	SW	.1000	.0100	15.6000	5.0000	BDL	10.7000
22957	89/ 6/11	S	.1600	.0200	16.0000	6.8000	BDL	11.7000
22957	89/ 6/29	NE	.1900	.0100	2.6000	1.0000	BDL	.9000
22957	89/ 7/11	SW	1.4000	BDL	1.6000	2.9000	BDL	5.7000
22957	89/ 7/28	SSW	.4000	BDL	1.3000	2.8000	BDL	3.7000
22957	89/ 8/ 4	SW	.9000	BDL	4.5000	3.0000	BDL	14.2000
22957	89/ 8/14	SSW	.7000	BDL	4.6000	3.1000	BDL	20.0000
22957	89/ 8/22	NW	.7000	BDL	3.3000	2.0000	BDL	10.4000
22957	89/ 9/ 9	SW	.5000	BDL	3.9000	7.0000	BDL	14.3000
22957	89/ 9/21	WNW	.4000	BDL	.4000	.7000	BDL	1.3000
22957	89/10/ 3	SW	1.1000	BDL	4.4000	4.2000	BDL	16.7000
22957	89/10/ 9	NE	.9000	BDL	.4000	.4000	BDL	.9000
22957	89/10/21	NE	1.2000	BDL	1.2000	5.0000	BDL	2.0000
ARITH MEAN			.5600	.0100	5.6100	3.2975	BDL	7.2650
STD DEV			.3928	.0044	5.0729	2.3854	BDL	5.7242
GEO MEAN			.4165	.0100	3.4737	2.1735	BDL	4.0020
MAXIMUM			1.4000	.0300	16.0000	7.1000	BDL	20.0000
MINIMUM			.1000	.0100	.4000	.0500	BDL	.9000
# OF SAMPLE			20	10	20	20	20	20

BDL - below detection limit

1983 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22959	83/ 1/ 6	SW	.1500	.0100	13.8000	3.4000	BDL	10.9000
22959	83/ 1/12	NW	.4500	.0100	.1000	.3000	BDL	1.4000
22959	83/ 2/23	NW	.1200	.0100	3.4000	.4000	BDL	2.4000
22959	83/ 3/ 1	NE	.6400	.0100	11.0000	7.6000	BDL	11.5000
22959	83/ 3/31	NE	.3700	.0200	4.4000	2.0000	BDL	3.1000
22959	83/ 4/30	S	.1300	.0100	7.4000	3.4000	BDL	5.2000
22959	83/ 5/ 6	S	.1700	.0100	2.6000	1.9000	BDL	2.7000
22959	83/ 5/30	SW	.0900	.0100	3.4000	.6000	BDL	2.7000
22959	83/ 6/ 5	SW	.0800	.0100	13.6000	2.7000	BDL	10.1000
22959	83/ 6/11	S	.2000	.0100	12.4000	6.8000	BDL	11.7000
22959	83/ 6/29	NE	.3900	.0100	3.8000	3.4000	BDL	1.9000
22959	83/ 7/11	SW	.5000	BDL	1.4000	2.7000	BDL	5.6000
22959	83/ 7/23	SSW	.5000	BDL	1.8000	2.4000	BDL	5.0000
22959	83/ 8/ 4	SW	.7000	BDL	3.3000	1.8000	BDL	11.2000
22959	83/ 8/16	SSW	.7000	BDL	5.4000	.6000	BDL	28.1000
22959	83/ 8/22	NW	.6000	BDL	3.1000	1.6000	BDL	11.7000
22959	83/ 9/ 9	SW	.4000	BDL	4.0000	4.1000	BDL	15.5000
22959	83/ 9/21	WNW	.6000	BDL	.6000	1.1000	BDL	1.9000
22959	83/10/ 3	SW	1.0000	BDL	4.4000	2.2000	BDL	18.4000
22959	83/10/ 9	NE	.8000	BDL	.5000	.7000	BDL	1.6000
22959	83/10/21	NE	1.2000	BDL	1.1000	5.0000	BDL	2.7000
ARITH MEAN			.4662	.0109	4.8333	2.6048	BDL	7.8714
STD DEV			.3019	.0029	4.1979	1.9429	BDL	6.7328
GEO MEAN			.3570	.0107	2.9565	1.8818	BDL	5.4286
MAXIMUM			1.2000	.0200	13.8000	7.6000	BDL	28.1000
MINIMUM			.0800	.0100	.1000	.3000	BDL	1.4000
# OF SAMPLE			21	11	21	21	21	21

1983 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22961	83/ 1/ 6	SW	.2900	.0200	9.6000	6.0000	BDL	7.8000
22961	83/ 1/12	NW	.7100	.0200	.1000	.9000	BDL	1.6000
22961	83/ 2/23	NW	.1200	.0200	3.4000	1.4000	BDL	2.2000
22961	83/ 3/ 1	NE	.9300	.0400	13.2000	8.7000	BDL	10.9000
22961	83/ 3/31	NE	.4100	.0300	4.0000	2.0000	BDL	2.7000
22961	83/ 4/30	S	.1700	.0400	7.4000	3.8000	BDL	5.0000
22961	83/ 5/ 6	S	.3800	.0300	3.8000	3.3000	BDL	3.8000
22961	83/ 5/30	SW	.2200	.1200	3.6000	2.5000	BDL	4.3000
22961	83/ 6/ 5	SW	.3200	.2700	11.4000	7.5000	BDL	13.7000
22961	83/ 6/11	S	.7300	.0800	12.0000	7.1000	BDL	11.2000
22961	83/ 6/29	NE	.8100	.0500	2.8000	2.3000	BDL	1.7000
22961	83/ 7/11	SW	.8000	BDL	1.4000	4.0000	BDL	4.3000
22961	83/ 7/23	SSW	.9000	BDL	1.3000	3.6000	BDL	4.5000
22961	83/ 8/ 4	SW	.8000	BDL	2.9000	4.4000	BDL	14.1000
22961	83/ 8/16	SSW	.8000	BDL	5.0000	3.6000	BDL	22.3000
22961	83/ 8/22	NW	.8000	BDL	2.9000	2.4000	BDL	10.8000
22961	83/ 9/ 9	SW	.8000	BDL	3.9000	10.1000	BDL	15.4000
22961	83/ 9/21	WNW	.4000	BDL	.5000	1.1000	BDL	2.2000
22961	83/10/ 3	SW	1.8000	.1000	3.6000	4.5000	BDL	19.2000
22961	83/10/ 9	NE	1.8000	BDL	.6000	.5000	BDL	1.9000
22961	83/10/21	NE	1.4000	BDL	1.5000	5.7000	BDL	4.6000
ARITH MEAN			.7257	.0483	4.5190	4.1619	BDL	7.8619
STD DEV			.4917	.0485	3.8146	2.6140	BDL	6.0242
GEO MEAN			.5884	.0480	2.8968	3.2520	BDL	5.7094
MAXIMUM			1.8000	.2700	13.2000	10.1000	BDL	22.3000
MINIMUM			.1200	.0200	.1000	.5000	BDL	1.6000
# OF SAMPLE			21	12	21	21	21	21

BDL - below detection limit

1983 Particulate Ions Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CL-	F-	NH4	NO3	P	SO4
22963	83/ 1/ 6	SW	1.0500	.0400	13.6000	7.1000	BDL	9.5000
22963	83/ 1/12	NW	1.4600	.0100	1.3000	1.1000	BDL	1.2000
22963	83/ 2/23	NW	.2500	.0100	4.4000	2.2000	BDL	2.5000
22963	83/ 3/ 1	NE	2.6500	.0500	16.6000	10.0000	BDL	13.1000
22963	83/ 3/31	NE	.9500	.0100	4.4000	2.4000	BDL	2.8000
22963	83/ 4/30	S	.8200	.0100	8.2000	4.4000	BDL	5.0000
22963	83/ 5/ 6	S	1.3900	.0100	3.2000	4.2000	BDL	3.9000
22963	83/ 5/30	SW	.5300	.0100	5.1000	2.7000	BDL	3.6000
22963	83/ 6/ 5	SW	.1600	.0100	14.2000	5.5000	BDL	12.3000
22963	83/ 6/11	S	.5000	.0100	10.2000	9.3000	BDL	12.8000
22963	83/ 6/29	NE	.3300	.0700	2.6000	2.6000	BDL	1.1000
22963	83/ 7/11	SW	.8000	BDL	1.2000	2.5000	BDL	4.2000
22963	83/ 7/28	SSW	.8000	BDL	1.1000	3.2000	BDL	4.3000
22963	83/ 8/ 4	SW	.9000	BDL	4.5000	3.1000	BDL	15.3000
22963	83/ 8/16	SSW	.9000	BDL	4.4000	5.8000	BDL	28.7000
22963	83/ 8/22	NW	1.0000	BDL	3.6000	2.3000	BDL	11.9000
22963	83/ 9/21	WNW	.7000	BDL	.7000	.8000	BDL	2.3000
22963	83/10/ 3	SW	1.3000	BDL	3.8000	4.1000	BDL	18.7000
22963	83/10/ 9	NE	1.4000	BDL	.4000	.3000	BDL	1.1000
ARITH MEAN			.9416	.0218	5.4474	3.8737	BDL	7.8579
STD DEV			.5471	.0204	4.7204	2.5902	BDL	6.5027
GEO MEAN			.7854	.0157	3.5513	2.9583	BDL	5.2422
MAXIMUM			2.6500	.0700	16.6000	10.0000	BDL	28.7000
MINIMUM			.1600	.0100	.4000	.3000	BDL	1.1000
# OF SAMPLE			19	11	19	19	19	19

1983 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22904	83/ 1/ 6	SW	6.80	.80	.118
22904	83/ 1/12	NW	1.50	.30	.200
22904	83/ 2/23	NW	2.00	.20	.100
22904	83/ 3/ 1	NE	10.80	2.50	.231
22904	83/ 3/31	NE	4.00	.90	.225
22904	83/ 4/30	S	3.50	.70	.200
22904	83/ 5/ 6	S	4.50	1.00	.222
22904	83/ 6/ 5	SW	8.20	4.00	.488
22904	83/ 6/11	S	7.00	2.10	.300
22904	83/ 6/29	NE	4.40	1.00	.227
22904	83/ 7/11	SW	6.70	.80	.119
22904	83/ 7/23	SSW	6.20	.60	.097
22904	83/ 8/ 4	SW	6.80	1.60	.235
22904	83/ 8/16	SSW	9.90	1.70	.172
22904	83/ 8/22	NW	6.30	.70	.111
22904	83/ 9/21	WNW	3.30	1.60	.485
22904	83/10/ 3	SW	12.00	1.80	.150
22904	83/10/ 9	NE	2.30	.80	.348
22904	83/10/21	NE	4.60	2.60	.565
	ARITH MEAN		5.68	1.35	
	STD DEV		2.86	.92	
	GEO MEAN		5.08	1.07	
	MAXIMUM		12.00	4.00	
	MINIMUM		1.50	.20	
	# OF SAMPLE		19	19	

1983 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22951	83/ 1/ 6	SW	7.10	1.20	.169
22951	83/ 1/12	NW	2.60	.20	.077
22951	83/ 2/23	NW	1.70	1.30	.765
22951	83/ 3/ 1	NE	14.70	1.00	.068
22951	83/ 3/31	NE	3.40	.40	.118
22951	83/ 4/30	S	2.90	.50	.172
22951	83/ 5/ 6	S	5.60	.30	.054
22951	83/ 5/30	SW	5.30	.20	.038
22951	83/ 6/ 5	SW	5.30	.70	.132
22951	83/ 6/29	NE	5.50	.50	:091
22951	83/ 7/11	SW	7.30	1.00	.137
22951	83/ 7/23	SSW	7.20	.90	.125
22951	83/ 8/ 4	SW	7.60	1.90	.250
22951	83/ 8/16	SSW	11.30	4.90	.434
22951	83/ 8/22	NW	6.90	1.80	.261
22951	83/ 9/ 9	SW	9.10	1.50	.165
22951	83/ 9/21	WNW	2.60	.60	.231
22951	83/10/ 3	SW	12.70	2.20	.173
22951	83/10/ 9	NE	2.90	1.30	.448
22951	83/10/21	NE	5.10	1.00	.196
	ARITH MEAN		6.34	1.17	
	STD DEV		3.42	1.02	
	GEO MEAN		5.46	.84	
	MAXIMUM		14.70	4.90	
	MINIMUM		1.70	.20	
	# OF SAMPLE		20	20	

BDL - below detection limit

1988 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22952	88/ 1/ 6	SW	7.20	.80	.042
22952	88/ 1/12	NW	3.90	.40	.103
22952	88/ 2/23	NW	4.00	1.20	.300
22952	88/ 4/30	S	3.30	.80	.242
22952	88/ 5/ 6	S	4.80	.40	.083
22952	88/ 5/30	SW	3.90	.30	.077
22952	88/ 6/ 5	SW	6.10	.80	.131
22952	88/ 6/11	S	8.00	.80	.100
22952	88/ 6/29	NE	6.80	.50	.074
22952	88/ 7/11	SW	4.50	.40	.089
22952	88/ 7/28	SSW	6.00	.80	.133
22952	88/ 8/ 4	SW	7.10	1.90	.268
22952	88/ 8/16	SSW	9.00	1.20	.133
22952	88/ 8/22	NW	6.40	.60	.094
22952	88/ 9/ 9	SW	9.30	1.50	.161
22952	88/ 9/21	WNW	8.50	1.30	.371
22952	88/10/ 3	SW	9.60	.90	.094
22952	88/10/ 9	NE	2.80	.40	.143
22952	88/10/21	NE	5.10	1.00	.196
	ARITH MEAN		5.84	.82	
	STD DEV		2.07	.43	
	GEO MEAN		5.49	.71	
	MAXIMUM		9.60	1.90	
	MINIMUM		2.80	.30	
	# OF SAMPLE		19	19	

1988 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22953	88/ 1/ 6	SW	6.90	1.20	.174
22953	88/ 1/12	NW	1.50	.60	.400
22953	88/ 2/23	NW	1.50	.20	.133
22953	88/ 3/ 1	NE	10.40	1.90	.183
22953	88/ 3/31	NE	4.30	.80	.186
22953	88/ 4/30	S	3.70	.80	.216
22953	88/ 5/ 6	S	5.10	1.70	.333
22953	88/ 5/30	SW	4.80	.30	.063
22953	88/ 6/ 5	SW	6.40	.80	.125
22953	88/ 6/11	S	7.90	1.30	.165
22953	88/ 6/29	NE	7.80	1.40	.179
22953	88/ 7/11	SW	6.20	.90	.145
22953	88/ 7/28	SSW	5.20	.40	.077
22953	88/ 8/ 4	SW	6.30	.70	.111
22953	88/ 8/16	SSW	9.20	.70	.076
22953	88/ 8/22	NW	6.80	.20	.029
22953	88/ 9/ 9	SW	11.20	1.10	.098
22953	88/10/ 3	SW	10.10	.80	.079
22953	88/10/ 9	NE	2.80	1.20	.429
22953	88/10/21	NE	4.90	.90	.184
	ARITH MEAN		6.15	.89	
	STD DEV		2.69	.45	
	GEO MEAN		5.43	.74	
	MAXIMUM		11.20	1.90	
	MINIMUM		1.50	.20	
	# OF SAMPLE		20	20	

BDL - below detection limit

1988 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22955	88/ 1/ 6	SW	6.20	2.50	.408
22955	88/ 1/12	NW	2.50	.60	.240
22955	88/ 3/ 1	NE	11.80	1.90	.161
22955	88/ 3/31	NE	4.70	1.10	.234
22955	88/ 4/30	S	2.90	.50	.172
22955	88/ 5/30	SW	4.60	.60	.130
22955	88/ 6/ 5	SW	5.90	1.00	.169
22955	88/ 6/11	S	7.50	.60	.080
22955	88/ 6/29	NE	6.30	.70	.111
22955	88/ 7/11	SW	5.80	.40	.069
22955	88/ 7/28	SSW	6.00	.20	.033
22955	88/ 8/ 4	SW	7.40	.60	.081
22955	88/ 8/16	SSW	9.80	.60	.061
22955	88/ 9/ 9	SW	11.40	.90	.079
22955	88/ 9/21	WNW	2.40	1.70	.708
22955	88/10/ 3	SW	9.60	1.40	.146
22955	88/10/ 9	NE	2.90	.80	.276
22955	88/10/21	NE	4.80	.10	.021
	ARITH MEAN		6.25	.90	
	STD DEV		2.82	.60	
	GEO MEAN		5.60	.71	
	MAXIMUM		11.80	2.50	
	MINIMUM		2.40	.10	
	# OF SAMPLE		18	18	

1988 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22957	88/ 1/ 6	SW	7.50	.50	.067
22957	88/ 1/12	NW	2.70	.20	.074
22957	88/ 2/28	NW	2.10	.60	.286
22957	88/ 3/ 1	NE	12.00	1.90	.158
22957	88/ 4/30	S	3.40	.80	.235
22957	88/ 5/ 6	S	5.60	.80	.143
22957	88/ 5/30	SW	6.50	1.00	.154
22957	88/ 6/ 5	SW	8.20	1.20	.146
22957	88/ 6/11	S	10.70	.80	.075
22957	88/ 6/29	NE	4.90	.50	.102
22957	88/ 7/11	SW	10.20	1.10	.108
22957	88/ 7/28	SSW	7.00	.70	.100
22957	88/ 8/ 4	SW	7.70	.20	.026
22957	88/ 8/16	SSW	11.90	.80	.067
22957	88/ 8/22	NW	8.00	.10	.013
22957	88/ 9/21	WNW	2.90	.60	.207
22957	88/10/ 3	SW	14.80	.80	.054
22957	88/10/ 9	NE	2.80	BDL	BDL
22957	88/10/21	NE	5.20	.30	.058
	ARITH MEAN		7.03	.68	
	STD DEV		3.47	.48	
	GEO MEAN		6.11	.48	
	MAXIMUM		14.80	1.90	
	MINIMUM		2.10	.00	
	# OF SAMPLE		19	19	

BDL - below detection limit

1983 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22959	83/ 1/ 6	SW	4.20	1.40	.333
22959	83/ 1/12	NW	2.10	1.00	.476
22959	83/ 2/23	NW	2.50	.90	.360
22959	83/ 3/ 1	NE	10.60	1.60	.151
22959	83/ 3/31	NE	5.50	1.90	.345
22959	83/ 5/30	SW	4.00	1.50	.375
22959	83/ 6/ 5	SW	9.40	1.70	.181
22959	83/ 6/11	S	8.90	1.00	.112
22959	83/ 6/29	NE	8.60	1.10	.128
22959	83/ 7/11	SW	9.50	.40	.042
22959	83/ 7/29	SSW	7.70	.10	.013
22959	83/ 8/ 4	SW	8.40	.40	.048
22959	83/ 8/16	SSW	10.70	1.00	.093
22959	83/ 8/22	NW	8.70	.30	.034
22959	83/ 9/ 9	SW	10.70	.50	.047
22959	83/ 9/21	WNW	3.30	BDL	BDL
22959	83/10/ 3	SW	12.20	.80	.066
22959	83/10/ 9	NE	3.00	BDL	BDL
22959	83/10/21	NE	7.10	.30	.042
ARITH MEAN			7.22	.85	
STD DEV			3.10	.57	
GEO MEAN			6.88	.65	
MAXIMUM			12.20	1.90	
MINIMUM			2.10	.00	
# OF SAMPLE			19	19	

1983 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22961	83/ 1/ 6	SW	7.60	1.80	.237
22961	83/ 1/12	NW	2.20	.50	.227
22961	83/ 2/23	NW	2.40	.40	.167
22961	83/ 3/ 1	NE	11.90	2.10	.176
22961	83/ 3/31	NE	4.70	.60	.128
22961	83/ 4/27	S	13.90	2.10	.151
22961	83/ 4/30	S	3.60	.70	.194
22961	83/ 5/ 6	S	30.90	3.30	.107
22961	83/ 5/30	SW	6.10	.80	.131
22961	83/ 6/ 5	SW	10.40	.60	.058
22961	83/ 6/11	S	10.30	1.40	.136
22961	83/ 6/29	NE	7.70	2.10	.273
22961	83/ 7/11	SW	14.20	2.90	.204
22961	83/ 7/29	SSW	7.00	.80	.114
22961	83/ 8/ 4	SW	9.70	1.10	.113
22961	83/ 8/16	SSW	11.00	1.10	.100
22961	83/ 8/22	NW	9.00	1.10	.123
22961	83/ 9/ 9	SW	15.30	3.30	.213
22961	83/ 9/21	WNW	5.10	1.10	.216
22961	83/10/ 3	SW	13.20	3.10	.235
22961	83/10/ 9	NE	3.00	BDL	BDL
ARITH MEAN			9.49	1.47	
STD DEV			6.20	.99	
GEO MEAN			7.78	.87	
MAXIMUM			30.90	3.30	
MINIMUM			2.20	.00	
# OF SAMPLE			21	21	

BDL - below detection limit

1983 Carbon Data (ug/m3)

STAT'N NUMBER	DATE	WIND DIRECT'N	CT	CF	RATIO (CF/CT)
22963	83/ 1/ 6	SW	8.60	.50	.058
22963	83/ 1/12	NW	2.70	.40	.148
22963	83/ 2/23	NW	2.30	.40	.174
22963	83/ 3/ 1	NE	14.00	2.40	.171
22963	83/ 3/31	NE	4.20	.60	.143
22963	83/ 4/30	S	3.50	1.20	.343
22963	83/ 5/ 6	S	8.90	1.60	.180
22963	83/ 5/30	SW	5.60	1.10	.196
22963	83/ 6/ 5	SW	4.50	1.40	.311
22963	83/ 6/11	S	11.80	1.60	.136
22963	83/ 6/29	NE	4.60	.80	.121
22963	83/ 7/11	SW	7.80	.30	.038
22963	83/ 7/28	SSW	7.80	1.00	.128
22963	83/ 8/ 4	SW	7.80	1.40	.179
22963	83/ 8/14	SSW	12.50	1.20	.096
22963	83/ 8/22	NW	8.60	.40	.047
22963	83/ 9/ 9	SW	12.00	2.50	.208
22963	83/ 9/21	WNW	4.60	1.20	.261
22963	83/10/ 3	SW	13.40	1.20	.090
22963	83/10/ 9	NE	2.30	BDL	BDL
22963	83/10/21	NE	6.00	.50	.083

ARITH MEAN	7.41	1.03
STD DEV	3.42	.64
GEO MEAN	6.45	.64
MAXIMUM	14.00	2.50
MINIMUM	2.30	.00
# OF SAMPLE	21	21

BDL - below detection limit

Appendix 2

NEMP PRECIPITATION DATA COLLECTED DURING JANUARY TO DECEMBER 1983

Data are presented on a 28 day basis according to sampling station. All concentrations are expressed in mg/l except precipitation volume which is expressed in ml. Total acidity is expressed as $CaCO_3$. (N/A) represents missing or unavailable data. The NO_3^- and NH_4^+ concentrations are expressed as N-NO_3^- and N-NH_4^+ respectively.

1988 Precipitation Trace Metal Data (MG/L)

STAT'N NUMBER	REMOVAL DATE	CA	CD	CU	FE	K	MG	MN	NA	NI	PB	P	V	ZN	AL
22702	FEB 1,88	1.0000	DBL	0.0000	0.0770	0.0000	0.0100	0.0070	0.0600	DBL	0.0190	0.0210	DBL	0.0200	0.0570
22702	MAR 1,88	1.1000	0.0002	DBL	0.0770	0.0000	0.0600	0.0100	0.0750	DBL	0.0150	0.0310	DBL	0.0170	0.0900
22702	MAR 29,88	N/A	0.0001	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0470	N/A	N/A	N/A
22702	APR 26,88	0.4000	N/A	DBL	0.0610	0.0400	0.1100	0.0030	0.1000	DBL	0.0070	0.0140	DBL	0.0100	0.0090
22702	MAY 24,88	0.5700	DBL	0.0000	0.0770	0.0100	0.1400	0.0070	0.0030	DBL	0.0040	0.0120	DBL	0.0000	0.0710
22702	JUN 21,88	2.4000	DBL	0.0000	0.0770	0.1000	0.7050	0.0200	0.0700	0.0002	0.0070	0.0040	DBL	0.0060	0.3040
22702	JUL 19,88	1.0400	0.0002	0.0010	0.0090	0.1400	0.3000	0.0000	0.0000	DBL	0.0190	0.0130	DBL	0.0140	0.0710
22702	AUG 16,88	0.4000	0.0001	0.0010	0.0400	0.0400	0.0700	0.0000	0.0050	DBL	0.0070	0.0070	DBL	0.0040	0.0310
22702	SEP 13,88	N/A	DBL	0.0070	0.0070	N/A	N/A	0.0060	N/A	0.0010	0.0050	0.0400	DBL	0.0400	0.1500
22702	OCT 11,88	1.0000	0.0002	0.0000	0.0610	0.0700	0.0500	0.0100	0.0000	DBL	0.0140	0.0210	DBL	0.0100	0.2400
22702	NOV 8,88	0.7200	DBL	DBL	0.1250	0.0700	0.0200	0.0100	0.0700	DBL	0.0000	0.0040	DBL	0.0140	0.1300
22702	DEC 6,88	0.4500	DBL	DBL	0.0040	0.0400	0.1100	0.0040	0.1150	DBL	0.0070	0.0070	DBL	0.0110	0.0310
22702	JAN 3,84	0.6000	DBL	0.0000	0.1500	0.0000	0.1500	0.0100	0.4750	DBL	0.0110	0.0190	DBL	0.0070	0.1590
ARITH MEAN		.8973	N/A	.0000	.1394	.0648	.0628	.0187	.1786	N/A	.0127	.0266	N/A	.0156	.1207
STD DEV		.5468	N/A	.0019	.1918	.0427	.1500	.0094	.1500	N/A	.0070	.0172	N/A	.0100	.0799
GEO MEAN		.7762	N/A	.0004	.1072	.0589	.0146	.0162	.1069	N/A	.0110	.0214	N/A	.0100	.0900
MAXIMUM		2.4000	N/A	.0070	.0770	.1500	.7050	.0060	.0750	N/A	.0070	.0620	N/A	.0400	.3040
MINIMUM		.4000	N/A	.0010	.0040	.0000	.0900	.0040	.0050	N/A	.0040	.0070	N/A	.0040	.0310
# OF SAMPLE		11	12	12	12	12	12	12	12	12	12	10	12	12	12
VOL WT MEAN		.6927	N/A	.0012	.1001	.0501	.1716	.0086	.1674	N/A	.0108	.0171	N/A	.0107	.0950

1988 Precipitation Trace Metal Data (MG/L)

STAT'N NUMBER	REMOVAL DATE	CA	CD	CU	FE	K	MG	MN	NA	NI	PB	P	V	ZN	AL
22703	FEB 1,88	0.4500	0.0001	0.0000	0.0730	0.0000	0.0000	0.0070	0.1050	DBL	0.0120	0.0000	DBL	0.0120	0.0340
22703	MAR 1,88	0.4200	DBL	0.0100	0.0600	0.0000	0.0700	0.0400	0.1200	DBL	0.0100	0.0140	DBL	0.0070	0.0500
22703	MAR 29,88	0.5200	0.0002	0.0000	0.1400	0.0000	0.1000	0.0100	0.0000	DBL	0.0100	0.0040	DBL	0.0070	0.1000
22703	APR 26,88	0.3000	DBL	0.0000	0.0010	0.0400	0.0000	0.0000	0.0000	DBL	0.0040	0.0100	DBL	0.0070	0.1200
22703	MAY 24,88	0.4400	DBL	0.0010	0.0020	0.0400	0.0700	0.0050	0.0550	DBL	0.0040	0.0000	DBL	0.0030	0.0570
22703	JUN 21,88	0.8000	DBL	0.0000	0.0760	0.0700	0.0000	0.0100	0.0500	DBL	0.0120	0.0000	DBL	0.0070	0.0440
22703	JUL 19,88	0.8100	DBL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0250	DBL	0.0040	0.0070	DBL	0.0000	0.0200
22703	AUG 16,88	0.8700	0.0002	0.0000	0.0000	0.0000	0.0400	0.0040	0.0550	DBL	0.0130	0.0070	DBL	0.0070	0.0250
22703	SEP 13,88	0.4000	DBL	0.0000	0.0000	0.0000	0.0700	0.0030	0.0400	DBL	0.0150	0.0140	DBL	0.0040	0.0260
22703	OCT 11,88	0.4000	DBL	DBL	0.0440	0.0000	0.0500	0.0050	0.0000	DBL	0.0040	0.0100	DBL	0.0070	0.0500
22703	NOV 8,88	0.2000	DBL	DBL	0.0100	0.0000	0.0400	0.0030	0.0500	DBL	0.0030	0.0010	DBL	0.0000	0.0100
22703	DEC 6,88	0.2400	DBL	0.0010	0.0470	DBL	0.0400	0.004	0.0050	DBL	0.0040	0.0100	DBL	0.0040	0.0770
22703	JAN 3,84	0.3000	DBL	DBL	0.0100	DBL	0.1050	0.0100	0.1050	DBL	0.0040	0.0000	DBL	0.0000	0.0190
ARITH MEAN		.5000	N/A	.0001	.0710	.0004	.0704	.0107	.0740	N/A	.0067	.0102	N/A	.0047	.0450
STD DEV		.1957	N/A	.0004	.0500	.0191	.0610	.0146	.0561	N/A	.0041	.0064	N/A	.0040	.0500
GEO MEAN		.4648	N/A	.0015	.0646	.0250	.0432	.0071	.0433	N/A	.0076	.0110	N/A	.0070	.0475
MAXIMUM		.8200	N/A	.0100	.0100	.0700	.1050	.0400	.1050	N/A	.0150	.0000	N/A	.0400	.0190
MINIMUM		.2000	N/A	.0000	.0100	.0000	.0000	.0000	.0050	N/A	.0000	.0040	N/A	.0000	.0100
# OF SAMPLE		10	10	10	10	10	10	10	10	10	10	10	10	10	10
VOL WT MEAN		.5093	N/A	.0017	.0709	.0047	.0700	.0099	.0720	N/A	.0074	.0120	N/A	.0090	.0700

N/A - data not available
DBL - below detection limit

1988 Precipitation Trace Metal Data (MG/L)

STAT'N NUMBER	REMOVAL DATE	CA	CD	CU	FE	K	MG	MN	NA	NI	PB	P	V	ZN	AL
22954	FEB 1,88	0.4800	0.0002	0.0000	0.0460	0.0000	0.0960	0.0000	0.1400	BDL	0.0000	0.0100	BDL	0.0110	0.0050
22954	MAR 1,88	0.5700	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.1300	BDL	0.0090	0.0130	BDL	0.0070	0.0500
22954	MAR 29,88	0.4700	BDL	0.0000	0.0000	0.0000	0.0700	0.0040	0.1000	BDL	0.0100	0.0160	BDL	0.0040	0.0460
22954	APR 26,88	0.4600	BDL	0.0010	0.0400	0.0000	0.0000	0.0000	0.0000	BDL	0.0070	0.0000	BDL	0.0040	0.0740
22954	MAY 24,88	0.2000	0.0001	0.0000	0.0400	0.0000	0.0000	0.0040	0.0000	BDL	0.0040	0.0070	BDL	0.0000	0.0490
22954	JUN 21,88	0.4100	BDL	0.0040	0.0470	0.0400	0.0000	0.0070	0.0000	BDL	0.0100	0.0120	BDL	0.0040	0.0350
22954	JUL 19,88	0.3400	0.0001	0.0010	0.0010	0.0700	0.0400	0.0040	0.0000	0.0010	0.0070	0.0140	BDL	0.0000	0.0400
22954	AUG 16,88	0.3000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0040	0.0000	0.0010	0.0100	0.0100	BDL	0.0070	0.0340
22954	SEP 13,88	0.4000	BDL	0.0000	0.0400	0.0400	0.1150	0.0000	0.0400	BDL	0.0140	0.0150	BDL	0.0040	0.0000
22954	OCT 11,88	0.5200	BDL	0.0010	0.0700	0.0700	0.1000	0.0070	0.0150	BDL	0.0120	0.0110	BDL	0.0110	0.0050
22954	NOV 8,88	1.1400	BDL	BDL	0.0000	0.4700	0.2400	0.0000	0.0400	0.0010	0.0040	0.0470	BDL	0.0040	0.0400
22954	DEC 6,88	0.8300	BDL	BDL	0.0070	0.0000	0.0450	0.0000	0.0000	BDL	0.0040	0.0110	BDL	0.0040	0.0300
22954	JAN 3,84	0.2500	BDL	0.0040	0.0970	BDL	0.0150	0.0000	0.1000	BDL	0.0040	0.0010	BDL	0.0040	0.1150
ARITH MEAN		.4428	N/A	.0019	.0578	.0740	.0915	.0047	.0754	N/A	.0100	.0140	N/A	.0040	.0343
STD DEV		.2107	N/A	.0011	.0174	.1161	.0402	.0018	.0400	N/A	.0040	.0106	N/A	.0019	.0213
GEO MEAN		.4044	N/A	.0016	.0535	.0894	.0888	.0045	.0687	N/A	.0088	.0147	N/A	.0044	.0280
MAXIMUM		1.1400	N/A	.0040	.0970	.4700	.2450	.0070	.1350	N/A	.0200	.0470	N/A	.0110	.1150
MINIMUM		.2000	N/A	.0005	.0370	.0025	.0450	.0000	.0150	N/A	.0040	.0070	N/A	.0050	.0000
# OF SAMPLE		13	13	13	13	13	13	13	13	13	13	13	13	13	13
VOL WT MEAN		.4549	N/A	.0014	.0581	.0649	.0789	.0045	.0712	N/A	.0088	.0140	N/A	.0044	.0530

1988 Precipitation Trace Metal Data (MG/L)

STAT'N NUMBER	REMOVAL DATE	CA	CD	CU	FE	K	MG	MN	NA	NI	PB	P	V	ZN	AL
22956	FEB 1,88	0.6700	0.0001	0.0000	0.0400	0.0050	0.2950	0.0040	0.2050	BDL	0.0170	0.0140	BDL	0.0120	0.0540
22956	MAR 1,88	0.4000	BDL	0.0000	0.0290	0.0150	0.1000	BDL	0.2000	BDL	0.0120	0.0170	BDL	0.0040	0.0400
22956	MAR 29,88	0.4500	BDL	BDL	0.0400	0.1000	0.1200	0.0040	0.1600	BDL	0.0000	0.0410	BDL	0.0050	0.0700
22956	APR 26,88	0.4500	BDL	BDL	0.0000	0.0000	0.1000	0.0040	0.1000	BDL	0.0000	0.0150	BDL	0.0050	0.0010
22956	MAY 24,88	0.4000	BDL	0.0010	0.0000	0.0000	0.0700	0.0000	0.0700	BDL	0.0000	0.0100	BDL	0.0040	0.0400
22956	JUN 21,88	0.2700	0.0001	BDL	0.0040	0.0000	0.0700	0.0050	0.0400	BDL	0.0000	0.0210	BDL	0.0090	0.0070
22956	JUL 19,88	0.3500	0.0000	N/A	0.0040	0.0400	0.0700	0.0040	0.0050	BDL	0.0040	0.0070	BDL	0.0500	1.0050
22956	AUG 16,88	0.3400	BDL	0.0000	0.0470	0.0000	0.0700	0.0040	0.0000	BDL	0.0070	0.0070	BDL	0.0000	0.0400
22956	SEP 13,88	0.3000	BDL	0.0000	0.0070	0.0400	0.1000	0.0000	0.0400	0.0010	0.0140	0.0100	BDL	0.0000	0.0050
22956	OCT 11,88	0.3000	BDL	BDL	0.0040	0.0000	0.0700	0.0040	0.0000	BDL	0.0000	0.0000	BDL	0.0040	0.0750
22956	NOV 8,88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.1200	N/A	N/A	N/A
22956	DEC 6,88	0.2500	BDL	BDL	0.0000	0.0100	0.0400	0.0000	0.1400	BDL	0.0040	0.0100	BDL	0.0070	0.0300
22956	JAN 3,84	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ARITH MEAN		.4000	N/A	.0010	.1004	.0400	.1100	.0000	.0764	N/A	.0101	.0047	N/A	.0104	.1407
STD DEV		.1400	N/A	.0004	.0004	.0002	.0400	.0014	.0700	N/A	.0104	.0001	N/A	.0100	.0774
GEO MEAN		.3004	N/A	.0017	.0414	.0070	.0770	.0000	.0700	N/A	.0075	.0107	N/A	.0074	.0404
MAXIMUM		.0700	N/A	.0000	.0040	.1000	.0700	.0040	.0000	N/A	.0540	.1000	N/A	.0000	1.0050
MINIMUM		.2500	N/A	.0010	.0000	.0100	.0400	.0000	.0000	N/A	.0007	.0070	N/A	.0040	.0000
# OF SAMPLE		11	11	11	11	11	11	11	11	11	11	11	11	11	11
VOL WT MEAN		.3700	N/A	.0009	.0001	.0409	.0744	.0000	.0000	N/A	.0077	.0000	N/A	.0009	.0335

N/A - data not available
BDL - below detection limit

1988 Precipitation Trace Metal Data (MG/L)

STAT'N NUMBER	REMOVAL DATE	CA	CD	CU	FE	K	MG	MN	NA	NI	PB	P	V	ZN	AL
82760	FEB 1,88	0.5300	0.0002	0.0020	0.0500	0.0400	0.1600	0.0030	0.1600	BDL	0.0140	0.0160	BDL	0.0140	0.0410
82760	MAR 1,88	0.2300	0.0001	0.0020	0.0570	0.0200	0.0600	0.0020	0.1350	BDL	0.0110	0.0120	BDL	0.0110	0.0420
82760	MAR 29,88	0.2700	0.0001	BDL	0.0460	0.0250	0.0350	0.0050	0.0420	BDL	0.0040	0.0070	BDL	0.0200	0.0400
82760	APR 26,88	0.3300	BDL	0.0020	0.0640	0.0400	0.0750	0.0040	0.0700	BDL	0.0060	0.0170	BDL	0.0090	0.0720
82760	MAY 24,88	0.4600	BDL	0.0010	0.0400	0.0450	0.1000	0.0040	0.0800	BDL	BDL	0.0110	BDL	0.0040	0.0500
82760	JUN 21,88	0.4700	0.0001	0.0020	0.0700	0.0020	0.1200	0.0020	0.0800	BDL	0.0120	0.0100	BDL	0.0080	0.0300
82760	JUL 19,88	0.7900	BDL	0.0020	0.0770	0.0850	0.2450	0.0080	0.0800	BDL	0.1000	0.0740	BDL	0.0070	0.4470
82760	AUG 16,88	0.4200	BDL	0.0010	0.0400	0.0400	0.1000	0.0040	0.0800	BDL	0.0060	0.0140	BDL	0.0050	0.0400
82760	SEP 13,88	0.8000	0.0001	0.0040	0.1400	0.0400	0.2000	0.0160	0.0700	BDL	0.0080	0.1000	BDL	0.0210	0.0720
82760	OCT 11,88	0.5200	BDL	BDL	0.0940	0.0340	0.1300	0.0060	0.0850	BDL	0.0100	0.0100	BDL	0.0070	0.0720
82760	NOV 8,88	0.2000	BDL	BDL	0.0170	0.0200	0.0600	0.0020	0.0400	BDL	0.0040	0.0140	BDL	0.0060	0.0140
82760	DEC 6,88	0.2400	0.0001	BDL	0.0080	0.0700	0.0850	0.0080	0.0700	BDL	0.0080	0.0070	BDL	0.0100	0.0240
82760	JAN 3,84	0.6100	BDL	BDL	0.1060	0.0850	0.2100	0.0800	0.2750	0.0010	0.0140	0.0190	BDL	0.0080	0.1270
ARITH MEAN		.5700	N/A	.0047	.1270	.1060	.1641	.0052	.0892	N/A	.0170	.0215	N/A	.0145	.1048
STD DEV		.4951	N/A	.0077	.2192	.1706	.1494	.0054	.0754	N/A	.0060	.0057	N/A	.0109	.1448
GEO MEAN		.4611	N/A	.0025	.0496	.0570	.1280	.0045	.0607	N/A	.0004	.0214	N/A	.0107	.0654
MAXIMUM		0.8000	N/A	.0200	.0770	.4850	.7200	.0160	.2750	N/A	.1000	.1000	N/A	.0370	.4470
MINIMUM		.2000	N/A	.0010	.0190	.0000	.0850	.0020	.0000	N/A	.0000	.0100	N/A	.0040	.0140
# OF SAMPLE		10	10	10	10	10	10	10	10	10	10	10	10	10	10
VOL WT MEAN		.4899	N/A	.0000	.0883	.0774	.1858	.0040	.0780	N/A	.0090	.0824	N/A	.0097	.0526

1988 Precipitation Trace Metal Data (MG/L)

STAT'N NUMBER	REMOVAL DATE	CA	CD	CU	FE	K	MG	MN	NA	NI	PB	P	V	ZN	AL
82760	FEB 1,88	0.0500	0.0001	0.0020	0.0520	0.0000	0.1000	0.0040	0.1600	BDL	0.0140	0.0040	BDL	0.0120	0.0340
82760	MAR 1,88	0.3300	BDL	BDL	0.0000	0.0100	0.0650	0.0000	0.1550	BDL	0.0000	0.0120	BDL	0.0070	0.0470
82760	MAR 29,88	0.4700	BDL	BDL	0.0000	0.0250	0.0000	0.0040	0.0850	BDL	0.0100	0.0060	BDL	0.0040	0.0440
82760	APR 26,88	0.6400	BDL	BDL	0.0000	0.0400	0.1000	0.0040	0.1000	BDL	0.0070	0.0070	BDL	0.0070	0.0700
82760	MAY 24,88	0.4400	BDL	0.0010	0.0100	0.0750	0.0700	0.0040	0.1050	BDL	0.0080	0.0100	BDL	0.0050	0.0340
82760	JUN 21,88	0.4000	BDL	BDL	0.0000	0.0950	0.1250	0.0060	0.0450	BDL	0.0000	0.0140	BDL	0.0110	0.0460
82760	JUL 19,88	0.4700	BDL	0.0020	0.0000	0.1100	0.1000	0.0040	0.0850	BDL	0.0000	0.0150	0.0020	0.0070	0.4910
82760	AUG 16,88	0.3600	BDL	0.0000	0.0040	0.1400	0.1000	0.0070	0.0850	BDL	0.0060	0.1170	BDL	0.0070	0.0500
82760	SEP 13,88	N/A	BDL	0.0030	0.0040	N/A	N/A	0.0120	N/A	BDL	0.0020	N/A	BDL	0.0140	0.1770
82760	OCT 11,88	0.4600	BDL	BDL	0.1150	0.0000	0.0700	0.0060	0.0150	BDL	0.0060	0.0040	BDL	0.0080	0.0070
82760	NOV 8,88	0.2600	BDL	BDL	0.0000	0.0050	0.0600	0.0020	0.0500	BDL	0.0040	0.0170	BDL	0.0160	0.0200
82760	DEC 6,88	0.3100	BDL	0.0010	0.0020	0.0000	0.0700	0.0020	0.0450	BDL	0.0000	0.0000	BDL	0.0000	0.0300
82760	JAN 3,84	0.1300	0.0001	BDL	0.0010	BDL	0.0500	0.0020	0.0050	BDL	0.0040	0.0000	BDL	0.0050	0.0300
ARITH MEAN		.4500	N/A	.0002	.1000	.0321	.0996	.0047	.0746	N/A	.0144	.0207	N/A	.0115	.1006
STD DEV		.1775	N/A	.0073	.0507	.0429	.0481	.0020	.0452	N/A	.0024	.0502	N/A	.0100	.1723
GEO MEAN		.4160	N/A	.0007	.0699	.0000	.0915	.0041	.0600	N/A	.0004	.0117	N/A	.0091	.0629
MAXIMUM		.6500	N/A	.0020	.1000	.1450	.1850	.0120	.1600	N/A	.0700	.1170	N/A	.0470	.4910
MINIMUM		.1500	N/A	.0010	.0000	.0000	.0000	.0020	.0150	N/A	.0020	.0040	N/A	.0050	.0200
# OF SAMPLE		10	10	10	10	10	10	10	10	10	10	10	10	10	10
VOL WT MEAN		.4400	N/A	.0011	.0421	.0488	.0919	.0047	.0670	N/A	.0067	.0066	N/A	.0070	.0540

N/A - data not available
BDL - below detection limit

1988 Precipitation Ions Data (MG/L)

STAT'N NUMBER	REMOVAL DATE	CL	NH4	NO3	N	SO4	ACID	PH	VOL
22902	FEB 1,88	0.6400	0.7700	0.9400	0.9400	5.0500	5.040	4.120	474
22902	MAR 1,88	0.8500	0.5500	0.9500	0.6400	4.5000	4.800	4.300	751
22902	MAR 29,88	1.7600	0.3800	0.7800	0.7500	4.8500	N/A	N/A	117
22902	APR 26,88	0.2500	0.2920	0.5400	0.4800	3.4000	4.530	4.240	1407
22902	MAY 24,88	0.1800	0.5800	0.8800	0.6500	4.5500	3.670	4.300	1640
22902	JUN 21,88	0.4100	1.4700	1.5500	1.5000	15.0000	9.830	3.960	449
22902	JUL 19,88	0.2100	1.4200	0.8000	1.5400	9.5000	6.480	4.060	1272
22902	AUG 16,88	0.1300	0.4500	0.5400	0.4800	5.4000	5.700	4.200	3650
22902	SEP 13,88	N/A	N/A	N/A	3.1000	N/A	3.870	4.770	144
22902	OCT 11,88	0.2400	0.5500	0.8400	0.6700	7.1000	6.100	4.050	1300
22902	NOV 8,88	0.2300	0.4200	0.4700	0.5200	4.1500	2.780	4.500	1479
22902	DEC 6,88	0.2700	0.3900	0.5200	0.4300	3.8000	3.490	4.490	2169
22902	JAN 3,88	0.7300	0.6400	0.8500	0.1700	1.8500	2.270	4.720	1140
ARITH MEAN		.4933	.6093	.7900	.9115	5.7875	4.818	4.238	
STD DEV		.4485	.4101	.3822	.7978	3.5146	1.979	N/A	
GEO MEAN		.3652	.4611	.6676	.7114	5.0225	4.457	4.307	
MAXIMUM		1.7600	1.4700	1.5500	3.1000	15.0000	9.830	4.770	
MINIMUM		.1300	.0400	.3500	.1700	1.8500	2.270	3.960	
# OF SAMPLE		12	12	12	12	12	12	12	
VOL WT MEAN		.3050	.3977	.6161	.6484	5.1855	4.674	4.250	

1983 Precipitation Ions Data (MG/L)

STAT'N NUMBER	DATE	CL	NH4	NO3	N	SO4	ACID	PH	VOL
22953	FEB 1,83	0.3500	0.3560	0.7800	0.5100	3.5000	6.080	4.020	744
22953	MAR 1,83	0.2700	0.2240	0.5800	0.3400	2.7500	7.770	4.270	1044
22953	MAR 29,83	0.1800	0.2300	0.3800	0.2700	2.9000	3.910	4.340	1878
22953	APR 26,83	0.2500	0.2220	0.4200	0.3400	4.0500	5.410	4.140	1959
22953	MAY 24,83	0.1700	0.3700	0.3800	0.4500	4.0000	4.340	4.240	2554
22953	JUN 21,83	0.1300	0.6900	0.6400	1.0800	5.9000	6.390	4.040	1165
22953	JUL 19,83	0.0600	0.3500	0.3000	0.4400	3.8000	4.400	4.240	1454
22953	AUG 16,83	0.1700	0.4200	0.5100	0.4700	5.0500	5.980	4.140	-
22953	SEP 13,83	0.1400	0.6400	0.6200	0.6900	5.8000	5.480	4.220	893
22953	OCT 11,83	0.0800	0.4800	0.5400	0.5100	3.7500	3.810	4.300	1320
22953	NOV 8,83	0.1500	0.1500	0.3400	0.2000	2.9000	3.130	4.370	2000
22953	DEC 6,83	0.5400	0.1640	0.4500	0.2300	2.3500	9.860	4.270	1805
22953	JAN 3,83	0.2200	0.0400	0.4200	0.1600	1.7500	2.760	4.590	1239
ARITH MEAN		.2085	.3297	.5038	.4220	3.7000	5.325	4.227	
STD DEV		.1214	.1805	.1302	.2234	1.2898	1.984	N/A	
GEO MEAN		.1788	.2704	.4844	.3940	3.4708	5.017	4.251	
MAXIMUM		.5400	.6900	.7800	1.0800	5.9000	9.860	4.590	
MINIMUM		.0600	.0400	.3000	.1600	1.7500	2.760	4.020	
# OF SAMPLE		13	13	13	13	13	13	13	
VOL WT MEAN		.2118	.2981	.4783	.3945	3.4790	5.138	4.251	

N/A - data not available

1983 Precipitation Ions Data (MG/L)

STAT'N NUMBER	DATE	CL	NH3	NO3	H	SO4	ACID	PH	VOL
22954	FEB 1,83	0.3800	0.5400	0.7900	0.4000	3.8500	5.420	4.080	742
22954	MAR 1,83	0.4400	0.3600	0.7400	0.5200	4.0000	9.060	4.120	1148
22954	MAR 29,83	0.2800	0.2900	0.3800	0.4800	3.0000	3.400	4.340	1599
22954	APR 26,83	0.2100	0.2000	0.3400	0.4500	3.0000	4.870	4.220	1719
22954	MAY 24,83	0.1700	0.4900	0.8900	0.5500	4.2000	4.370	4.270	2591
22954	JUN 21,83	0.1300	0.6100	0.4400	0.7200	5.9000	6.460	4.070	874
22954	JUL 19,83	0.0700	0.6400	0.3800	0.7200	4.5500	4.260	4.240	2428
22954	AUG 16,83	0.1700	0.4100	0.3800	0.5000	4.3000	5.070	4.240	N/A
22954	SEP 13,83	0.1300	0.6700	0.5100	0.7400	4.6500	3.060	4.390	1848
22954	OCT 11,83	0.1100	0.5000	0.4400	0.6200	4.9000	4.820	4.170	1482
22954	NOV 8,83	0.3200	0.0400	0.2400	0.3000	3.6000	1.430	4.730	1775
22954	DEC 6,83	0.2900	0.2700	0.4800	0.3400	2.7300	3.740	4.320	2491
22954	JAN 3,84	0.3800	0.0100	0.2400	0.1900	1.9000	3.340	4.440	345
ARITH MEAN		.2508	.3980	.5020	.5185	3.9577	4.608	4.251	
STD DEV		.1141	.2020	.1716	.1697	.9798	1.741	N/A	
GEO MEAN		.2020	.2858	.4723	.4850	3.8292	4.284	4.279	
MAXIMUM		.4400	.6700	.7900	.7400	5.9000	9.060	4.730	
MINIMUM		.0700	.0100	.2400	.1900	1.9000	1.430	4.080	
# OF SAMPLE		13	13	13	13	13	13	13	
VOL WT MEAN		.2153	.4078	.4785	.5193	3.9308	4.345	4.279	

1983 Precipitation Ions Data (MG/L)

STAT'N NUMBER	DATE	CL	NH3	NO3	H	SO4	ACID	PH	VOL
22954	FEB 1,83	0.7400	0.5000	1.0100	0.6400	4.4500	6.140	4.050	693
22954	MAR 1,83	0.4000	0.2440	0.6200	0.3700	3.2300	5.170	4.150	973
22954	MAR 29,83	0.2400	0.5400	0.8400	1.0400	2.4000	1.330	6.830	1906
22954	APR 26,83	0.2500	0.2440	0.5700	0.3800	4.2300	5.340	4.170	1402
22954	MAY 24,83	0.1900	0.4200	0.4900	0.6100	4.4500	5.050	4.150	2285
22954	JUN 21,83	0.1500	0.7700	0.7200	0.9800	6.3500	6.970	4.050	1182
22954	JUL 19,83	0.1100	0.5200	0.4700	0.6200	5.6000	5.740	4.080	21
22954	AUG 16,83	0.1800	0.5000	0.6900	0.5700	6.3000	7.620	4.020	3304
22954	SEP 13,83	0.1500	0.5900	0.4500	0.6800	4.4000	4.260	4.250	911
22954	OCT 11,83	0.1700	0.2740	0.4900	0.2700	3.9500	4.440	4.350	1613
22954	NOV 8,83	N/A	0.2920	N/A	1.1000	N/A	8.170	4.410	1927
22954	DEC 6,83	0.3200	0.2400	0.5000	0.3900	2.6300	3.700	4.430	1712
22954	JAN 3,84	N/A	N/A	N/A	N/A	N/A	N/A	5.350	19
ARITH MEAN		.2673	.4320	.5710	.6400	4.4227	4.912	4.283	
STD DEV		.1755	.1610	.1741	.2615	1.2927	1.688	N/A	
GEO MEAN		.2270	.4021	.5482	.5885	4.2237	4.543	4.477	
MAXIMUM		.7400	.7700	1.0100	1.1000	6.3500	7.620	6.830	
MINIMUM		.1100	.2440	.3400	.2700	2.4000	1.330	4.020	
# OF SAMPLE		11	12	11	12	11	12	12	
VOL WT MEAN		.2485	.4178	.5601	.6474	4.4648	4.948	4.218	

N/A - data not available

1983 Precipitation Ions Data (MG/L)

STAT'N NUMBER	DATE	CL	NH4	NO3	N	SO4	ACID	PH	VOL
22958	FEB 1,83	0.5200	1.2400	1.1400	1.4200	4.9500	6.240	4.060	607
22958	MAR 1,83	0.3000	0.6400	0.6700	0.7200	3.5000	4.260	4.270	1040
22958	MAR 29,83	0.1700	0.5400	0.3700	0.8000	2.4500	2.910	4.490	2228
22958	APR 26,83	0.2700	0.6800	0.5800	0.8200	4.4000	4.520	4.280	1782
22958	MAY 24,83	0.2000	0.8100	0.4600	0.9500	5.0000	3.830	4.320	2544
22958	JUN 21,83	0.1700	1.1300	0.8400	1.2200	7.2000	6.080	4.030	481
22958	JUL 19,83	0.2300	1.3000	0.5400	1.7500	6.8500	2.540	4.670	21
22958	AUG 16,83	0.1600	0.8400	0.5700	0.8200	5.5500	4.960	4.260	3002
22958	SEP 13,83	0.4400	1.4300	1.1400	2.2500	9.9900	1.140	7.640	318
22958	OCT 11,83	0.1300	0.8000	0.5900	0.8500	5.1500	3.590	4.420	1747
22958	NOV 8,83	0.1400	0.5900	0.3500	0.6800	2.9000	2.500	4.520	2284
22958	DEC 6,83	0.4000	0.0180	0.5900	1.8500	4.1000	2.890	4.540	2619
22958	JAN 3,84	0.6100	0.5700	0.4600	0.5800	2.4000	1.80	5.190	950
	ARITH MEAN	.2877	.8160	.6491	1.2230	4.9569	3.700	4.376	
	STD DEV	.1509	.3677	.2498	.7205	2.0486	1.599	N/A	
	GEO MEAN	.2531	.6219	.6014	1.0782	4.5668	3.336	4.668	
	MAXIMUM	.6100	1.4300	1.1400	2.2500	9.9900	6.080	7.640	
	MINIMUM	.1300	.0180	.3500	.5800	2.4000	1.140	4.030	
	# OF SAMPLE	13	13	13	13	13	13	13	
	VOL WT MEAN	.2452	.6593	.5481	1.0023	4.3685	3.739	4.372	

1983 Precipitation Ions Data (MG/L)

STAT'N NUMBER	DATE	CL	NH4	NO3	N	SO4	ACID	PH	VOL
22960	FEB 1,83	0.4400	0.6200	0.8200	0.8000	4.7500	5.400	4.090	588
22960	MAR 1,83	0.3400	0.4200	0.8100	0.4900	4.4000	8.260	4.020	1111
22960	MAR 29,83	0.2100	0.2980	0.3800	0.7400	2.9500	3.920	4.350	1400
22960	APR 26,83	0.2800	0.9180	0.5600	0.7100	4.0000	4.730	4.230	1677
22960	MAY 24,83	0.1700	0.4700	0.4100	0.8500	4.4500	4.380	4.250	2595
22960	JUN 21,83	0.1600	0.8300	0.7100	0.9500	6.3000	5.930	4.130	965
22960	JUL 19,83	0.1000	0.7400	0.4700	0.9000	5.8000	4.710	4.150	24
22960	AUG 16,83	0.1500	0.7700	0.5300	1.2300	4.8500	3.750	4.450	4971
22960	SEP 13,83	N/A	1.2980	N/A	N/A	N/A	N/A	N/A	951
22960	OCT 11,83	N/A	0.4400	0.6200	0.4400	4.7000	4.720	4.290	1804
22960	NOV 8,83	0.1000	0.2080	0.3000	0.2600	2.4500	3.110	4.370	1888
22960	DEC 6,83	0.2400	0.8460	0.2400	0.4000	2.8000	3.500	4.380	2346
22960	JAN 3,84	0.2100	0.1100	0.3100	0.1700	1.4000	2.980	4.470	1750
	ARITH MEAN	.2255	.5277	.5133	.6050	4.0875	4.412	4.249	
	STD DEV	.0923	.3654	.1985	.3027	1.3317	1.389	N/A	
	GEO MEAN	.2086	.4421	.4779	.5262	3.8322	4.492	4.244	
	MAXIMUM	.4400	1.2980	.8200	1.2300	6.3000	8.260	4.470	
	MINIMUM	.1000	.1100	.2400	.1700	1.4000	2.980	4.020	
	# OF SAMPLE	11	13	12	12	12	12	12	
	VOL WT MEAN	.2078	.5015	.4755	.6495	3.9252	4.291	4.304	

N/A - data not available